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CHEMICAL

APRIL 1960

NO TIME FOR OBSOLETE METHODS

contractor-customer relations

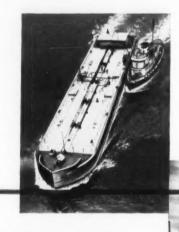
Page 24

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A PUTMAN PUBLICATION "Executive Magazines for Industry"

To recover spent sulfuric,

call on the leader in sulfuric



GENERAL CHEMICAL

Of General Chemical's 21 sulfuric plants, 15 are equipped to handle spent sulfuric! Here are their locations:

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Buffalo, New York
Denver, Colorado
East St. Louis, Illinois
Elizabeth, New Jersey
El Segundo (Los Angeles),
California

Hegewisch (Chicago), Illinois Newell, Pennsylvania North Claymont, Delaware Port Chicago (San Francisco), California Richmond (San Francisco),

Richmond (San Francisco), California

River Rouge, Michigan Valleyfield, Quebec*

*In Canada: Allied Chemical Canada, Ltd.

If you are seeking to recover spent sulfuric acid from your operations and your plant is in the vicinity of any of those listed above, it may pay you to talk to General Chemical.

As the nation's leading sulfuric producer, General has years of experience in recovering many types and strengths of spent acid for its customers. While all cannot be reclaimed, we will be happy to review the economics of recovering yours. As always, the assistance of our technical service staff is readily available to help solve any spent acid handling and disposal problems you may have.

Basic to
America's Progress



GENERAL CHEMICAL DIVISION

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DACE WE ALL

conventions and exhibits

April 3-6. American (i) Chemists' Society, Spring Meeting, Baker Hotel, Dallas. Texas.

April 3-8. American Chemical Society, 137th National Spring Meeting, Detroit Michigan.

April 3-8. 1960 Nuclear Congress, The Coliseum, New York City.

April 4-6. Third Instrument Society of America Symposium on Chemical and Petroleum Instrumentation, Hotel Sheraton, Rochester, N.Y.

April 4-7. 29th National Packaging Exposition, American Management Association, Convention Hall, Atlantic City, New Jersey.

April 5. Instrument Society of America, New Jersey Section, Computers in Process Industries Symposium, Hotel Essex House, Newark, New Jersey.

April 5-7. Instrument Society of America, National Chemical and Petroleum Symposium, Rochester, New York.

April 8-9. Society of Plastics Industry, Inc., 17th Western Section Conference, New Riviera Hotel, Palm Springs, California.

April 12-15. Ninth annual Instrumentation Short Course, Los Angeles Harbor Junior College, Wilmington, Calif.

April 18-19. Third Annual Conference on Automatic Techniques, Cleveland, Ohio

April 27-29. Instrument Society of America, Sixth Annual Southeastern Conference and Exhibit, and First Pulp and Paper Division Symposium, Pensacola, Florida.

May 9-12. 2nd Instrument Society of America, Instrument Automation Conference and Exhibit, Civic Auditorium, Brooks Hall, San Francisco, California.

May 23-26. The Design Engineering Show and Annual

Meetings and shows of interest to the chemical industries

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Design Engineering Conference, New York Coliseum, New York City.

June 1-3. Meeting of the Commercial Development Chemical Association on "process industries challenge in chemicals," Sea View Country Club, Absecon. New Jersey.

June 5-9. The Society of the Plastics Industry, Inc., Ninth National Plastics Exposition, Coliseum, New York City, and the SPI National Conference, Commodore Hotel, New York, New York.

June 9-11. Manufacturing Chemists Association, Meeting, White Sulphur Springs, West Virginia.

June 13-15. The Chemical Institute of Canada, 43rd Annual Conference and Exhibition, Chateau Laurier Hotel. Ottawa, Ont., Canada.

June 19-22. American Institute of Chemical Engineers, Del Prado Hotel, Mexico City, Mexico.

Aug. 8-9. Third Annual Rocky Mountain Spectroscopy Conference. Rocky Mountain Spectroscopy Section of the Society for Applied Spectroscopy, Denver, Colo.

Aug. 10-12. 9th Annual Denver Research Institute Metallury Division's X-ray Conference, Denver, Colo.

Aug. 14-17. American Institute of Chemical Engineers, 4th National Heat Transfer Conference, Statler Hotel, Buffalo, New York.

Aug. 23-25. Cryogenic Engineering Conference, University of Colorado, Boulder, Colo.

Sept. 25-28. American Institute of Chemical Engineers, Mayo Hotel, Tulsa, Oklahoma.

Sept. 26-30. Instrument Society of America, Instrument-Automation Conference and Exhibit, Coliseum, New York.

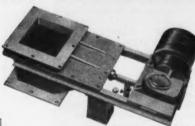
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Check 1001 opposite last page.

PACKAGED AIR HEATERS by THERMAL

Extreme compactness, high efficiency and versatility of operation are the chief characteristics of the THERMAL Type CA direct fired air heater. Designed around the high velocity THERMAL burner, it normally requires no refractory, since combustion is limited almost entirely to the burner itself. Adding to its versatility, the CA air heater performs equally well on gas, oil or combination firing and can be adapted to all pressure levels.

Type

CA

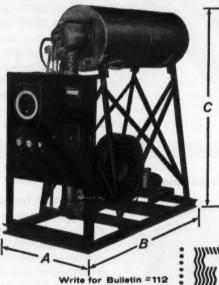
direct

Type CA air heaters are most frequently sold as "packaged" units complete with all necessary safety and control apparatus. These units will provide outputs ranging from 200,000 BTU/hr to better than 30,000,000 BTU/hr and at temperatures from 300F to 1500F or higher.

TYPICAL SIZES . . .

Listed below are the overall dimensions of a few of the dozens of output, temperature, and flow combinations possible in these heaters. Figures are for atmospheric pressure units. Higher pressure heaters would be smaller.

BTU/hr	AIR FLOW scfm	TEMP. IN	TEMP. OUT	A ft.	B ft.	C ft.
800,000	1,000	60	750 F	21/2	41/2	4
2,500,000	5,000	60	500 F	4	7	6
4,000,000	16,000	700	900 F	7	11	8
10,000,000	8,500	60	1,000 F	51/2	10	8
15,000,000	10,000	60	1,200 F	6	12	8



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Other Thermal F

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Check 1002 opposite last page.



April 1960

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Chemical Progress Year

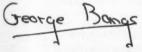
Chemical Progress Week is almost upon us again. During the period of April 25-29, the Manufacturing Chemists' Association will lead a well-organized effort to tell the chemical-industry "story." These activities deserve the full cooperation of everyone concerned.

The need for such efforts should be apparent to the most casual observer. In this era of cranberries, carcinogens and committees, taking potshots at the CPI has become a favorite pastime of many unimaginative writers with columns to fill. Add to these discordant notes, the everpresent background rumble of resentment against business in general, from some quarters, and you have a public-relations man's nightmare.

Such a situation is more than can be dealt with in just one week. Chemical Progress Week should be the kick-off of a Chemical Progress Year—every year. The MCA realizes this and works all-year-round to this end through its Chemical Industry Activity Committees.

Every individual in the chemical industry owes it to himself and his company to implement these organized efforts by his own actions. The facts are on his side: So-called carcinogens do not necessarily cause cancer in humans when consumed in microscopic amounts, just because some rats developed cancer after eating such agents in enormous quantities. Intelligent pursuit of profit in a competitive society is not inconsistent with the "public inter-set."

Chemical Progress Week can be the beginning of a never-ending series of Chemical Progress Years, if every person in the CPI keeps himself well informed and doesn't ever pass up an opportunity to discuss the issues at stake with his acquaintances.



Assistant Editor

Speedline

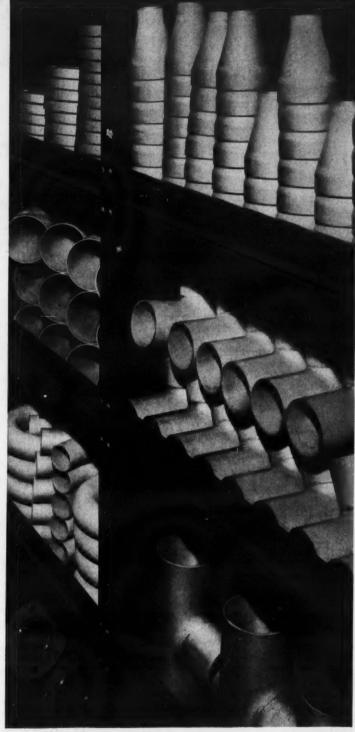
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It's one thing to catalog a complete line of long-tangent fittings . . . it's another to have them ready to ship to your plant—when you need them. Speedline engineering and manufacturing experience has "standardized" production on even the most specialized fittings . . . including eccentric reducers, reducing tees and crosses . . . making it possible to maintain extensive inventories both at the factory and in the field.

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Check 1003 opposite last page.

Special This Month

23 Process Dynamics prelude—computer control today! Improved payout often byproduct in considering ways in which control mathematics may be utilized

24 It's time to review Operator/Customer relations Panel of experts analyzes problems posed by development of new techniques for improved contractor services

30 Key to 'one-shot' ureth ane foams Organo-tin catalysts open door to practical and economical production

123 Compact scrubber stops air pollution Replaces two bulky packed towers for removing corrosive gases at Texas plant

149 Onyx Oil strong on fiber drums for liquids Exclusive CP report reveals huge freight savings, easier heading-up, other balance-sheet bonuses

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	U.S.	firms	without	coddling

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THIS MONTH'S COVER

Development by contractors of new techniques which provide improved services for manufacturer customers has also given rise to new problems. These problems and the general relationship of contractors and customers in the chemical processing industries are analyzed by panel of five experts in "Time to Take a New Look at Operator/Contractor Relations" . . . page 24, this issue.

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Spotlight On People

GENERAL ANTHONY C. McAu-LIFFE, vice president for personnel and public relations at American Cyanamid Company, has been elected a member of company's board of directors.

Witco Chemical Company, Inc., names Joseph J. Tumpeer as senior vice-president and special advisor and elects J. PORTER BRINTON JR. to board of directors.

Max E. Colson was elected vice president of Atlas Powder Company. He will be in charge of company's Explosives Division.

Chemicals Division of the Firestone Plastics Company announced four new appointments. Lee B. Kuhn was named vice-president of the Chemicals Division; Jay H. ROSENSON, sales manager; and T. C. Walker and J. E. Sloat will fill new positions as managers, sales development in the latex products and electrical materials departments.

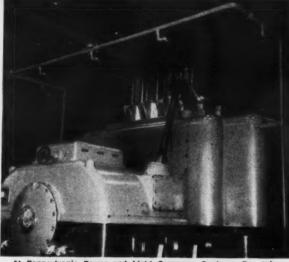
Chas Pfizer & Co. Inc., appointed Dr. Ernest M. Weber as executive director of research and development.

Metal & Thermit Corporation has announced appointments of three new vice presidents—HARRY W. BUCHANAN, manager of general sales department; DONALD W. OAKLEY, general manager of Coatings Division; and JOHN K. PARKS, general manager of Detinning Division

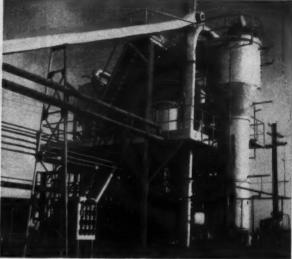
Pharmaceutical Division of Merck & Co., Inc., announces the election of STUART T. HENSHALL to post of vice president and general manager of Merck Sharp & Dohme and EUGENE L. KURYLOSKI takes over as vice president, marketing.

H. W. TRIPP was elected director of Wallace & Tiernan Incorporated.

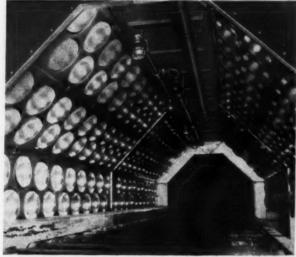
ALBERT H. CLEM was named to newly created office of vice president of marketing at Pennsalt Chemicals Corporation. George R. LAWSON will replace Mr. Clem as general manager of the Chemical Specialties Division and RUSSELL



At Pennsylvania Power and Light Company, Sunbury, Pa., this steam generator is protected by an automatic Grinnell Protecto-Spray system in the event of outside fires and by a Dry Chemical system inside the casing.



At Canadian Vegetable Oil Processing Ltd., Hamilton, Ontario, Grinnell ProtectoSpray safeguards upper structure of this hexane solvent extraction unit, while a ProtectoFoam system guards the lower section.



At the RCAF supply depot at Namao, Alberta, this infrared drying oven is protected by a Dry Chemical system engineered by Grinneli to protect against possible fire resulting from ignition of flammable vapor mixtures.



At Dresser Industries, Inc., Dallas, Texas, hot metal temporarily ignites resulting vapors as metal is being submerged. If fire should get out of control, a Grinnell-installed Carbon Dioxide system is on guard to extinguish it quickly.

You can rely on Grinnell for the right protection against destruction by fire!

Grinnell has had 90 years experience in devising fire protection systems for all kinds of fire hazards — systems which can be relied on to protect the continuity of your business and to safeguard your dollar investment. Grinnell offers you quality-controlled manufacturing, layouts by experienced engineers, and installations by skilled crews. Let

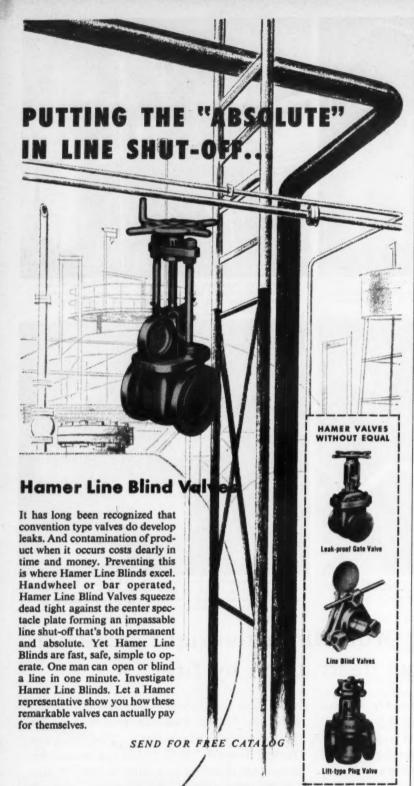
Grinnell engineers help you select the right system.

16 mm. Sound-Color Film—Get up to date on fire with Grinnell's 35-minute film— "Fire Protection Through Research." Both typical and unusual fire hazards are described and demonstrated. To borrow this film, without charge, write— Grinnell Company, Providence 1, Rhode Island.

GRINNELL

FIRE PROTECTION SYSTEMS SINCE 1870





WELL EQUIPMENT MFG. CORP.

HOUSTON, TEXAS
DIVISION OF CHIKSAN COMPANY

Check 1005 opposite last page.

W. Sloan was appointed manager of marketing planning department.

GROVER C. PAULSEN JR. was named vice president and technical director of Coastal Chemical Company.

California Spray-Chemical Corporation announced the appointment of Howard J. Grady as president and director. He succeeds A. W. Mohr who retired from the post.

Diamond Alkali Company announced two new appointments—Frank Chrencik was named vice president-Manufacturing and Arthur B. Till-Man will succeed Chrencik as general manager of the Electro Chemicals Division.

Union Carbide Metals Company named R. L. Pope as new marketing research manager.

JACK D. GUNTHER was elected to board of directors of The Ruberoid Co. Mr. Gunther is also vice president of Air Reduction Company, Incorporated.

The Petro-Tex Chemical Company announced appointment of Dr. L. Marshall Welch, director of research to post of vice president.

Reheis Company, Inc., named Milton E. Abraham to director of research.

C. E. Leach has been elected a vice president of Texas Butadiene & Chemical Corporation by board of directors.

WILLIAM M. SHINE has been appointed vice president of Celanese Development Company, a division of Celanese Corporation of America.

The Corn Division of A. E. Staley Manufacturing Company announced appointment of James H. Beaumont to position of assistant manager.

JOHN L. GILLIS was elected to board of directors at Chemstrand Corporation.

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The Dyestuff and Chemical Division of General Aniline & Film Corporation announced appointment of Dr. Cecil M. Knowles to post of manager, market development.

JAMES T. HILL JR. was elected to board of directors at Interchemical Corporation.

Pittsburgh Coke & Chemical Company announced election of PUTNAM B. McDowell 'to

CHEMICAL PROCESSING serves members of the Management Team in these industries:

Basic Chemical and Chemical Processing Industries

Industrial inorganic & organic chemicals (acids, alkalis, plastics, synthetic fibers, explosives, etc.)
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Fertilizers

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& toiletries, inks, insecticides, water treatment chemicals, etc.)
Paper & allied products
Petroleum, coal, coke-oven products
Rubber products
Stone, clay & glass products
Atomic energy establishments

Other Industries Utilizing Chemicals or Chemical Processes

Food and allied products Textile dyeing & finishing Leather tanning & finishing Metal & alloys Machinery & equipment Allied products (tobacco, photographic film, instruments, fabricated plastic products, etc.)
Water treating & purification plants
Government (including ordnance, missiles, etc.)

Specialized Services to the Chemical Processing Field

Plant construction consulting firms. Independent research & testing laboratories

Manufacturers of specialized chemical equipment

Subscriptions

QUALIFIED-READER SUBSCRIPTIONS are accepted from selected management and technical key men in the chemical industries without charge. To apply for a qualified-reader subscription fill in and mail the request-qualification form opposite last page.

OTHER SUBSCRIPTIONS — from "non-qualified" persons (those who are not key processing men in the chemical industries) — are accepted at \$1.00 the copy, or \$10.00 the year. Foreign subscriptions — subscriptions from countries outside the territory of the United States and its possessions are acceptable at \$35.00 per year. Such subscriptions are not counted as "industry circulation" on BPA audit reports.

the newly created position as vice president-administration.

The Corporate Development Department of General Aniline & Film Corporation announced three new appointments—Dr. F. A. HESSEL as manager of commercial research; Dr. W. W. WILLIAMS, manager of foreign liaison and Miss J. M. MORAN as senior development specialist.

GEORGE A. STEIN was appointed manager of technical service for Archer-Daniels-Midland Company's Plastics Division.

DR. HARRY H. WEINSTOCK JR. was appointed to the newly created position of co-ordinator, polyamide research and development at the Allied Chemical's National Aniline Division.

The Pitt-Consol Chemical Company subsidiary of Consolidation Coal Company announced two new appointments — N. E. Sylvander as vice president-operations and Benjamin W. Jones named as vice president-sales.

CHARLES A. CHURCH was named as sales promotion manager for Firestone Synthetic Rubber & Latex Company.

Dr. Charles A. Stokes joined the Columbian Carbon Company as general manager of research and development of the company's Carbon Black and Pigment Division.

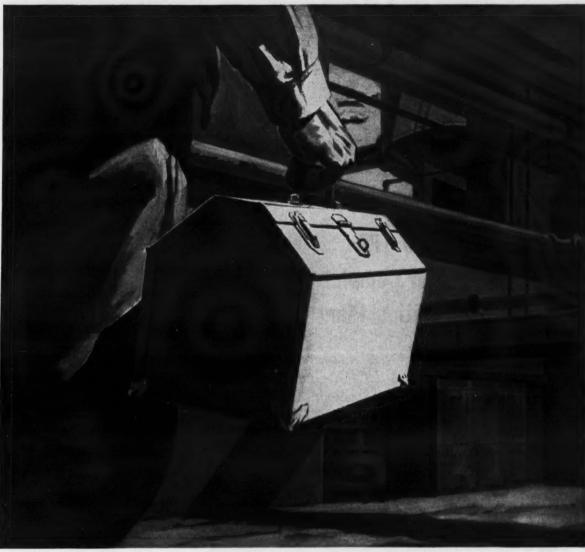
O. D. Myrick was appointed director of development planning of the Grace Chemical Group.

RAYMOND A. REINKE was promoted to vice president in charge of Continental Carbon Company's International Division.

Miles Chemical Company announced appointment of Dr. Willard J. Croxall as research coordinator and assistant to the president. In addition, their expanding program of research is aided by Dr. John Mirza, director of chemical research laboratory; Dr. Leonard B. Schweiger, director of biosynthesis research laboratory and Dr. Leland A. Underkofler, director of enzymology research laboratory.

ALLIS-CHALMERS





This maintenance man's toolbox sums up the story of

the simplest process in processing:

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Even the standard products Allis-Chalmers builds for chemical processing are designed for the industry's special requirements... and designed so routine inspection and maintenance are simply, quickly done.

And from no other manufacturer can you match the range of equipment available and benefit from Allis-Chalmers unit responsibility. Listed at right are some of the Allis-Chalmers products built to serve you economically throughout the plant — from raw material to finished product.

For service that matches the quality of the equipment, call the A-C representative near you. Or write Allis-Chalmers, Milwaukee 1, Wisconsin.

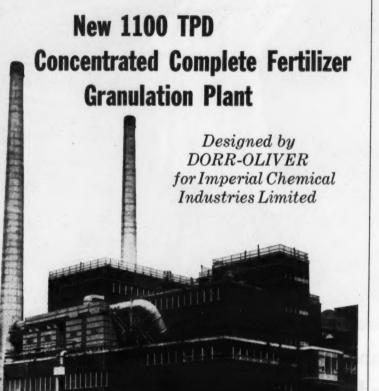
A-C products for chemicals: Electrical Generation and Distribution Equipment; Pumps, Motors, Control, Valves, Dielectric Heaters, Rectifers; Processing Machinery (mills, screens, kilns); Water Conditioning Systems, plus Material Handling Equipment.

A-1268

The more than 40 years' experience of the Dorr-Oliver organization in designing or equipping nearly 50 fertilizer projects in 17 countries has been utilized in another spectacular development — the largest C.C.F. granulation plant in the British Commonwealth and one of the largest in the world.

The plant is the latest addition to the immense 1100-acre chemical complex operated by Imperial Chemical Industries Limited at Billingham, England. Sulphate of ammonia, monoammonium phosphate and muriate of potash are combined by the Dorrco Granular Fertilizer Process to form a concentrated complete 12-12-18 fertilizer. Two processing units produce a total of 1100 tons per day.

If you are interested in the field of fertilizer production, call for a preliminary discussion, or write for information to Dorr-Oliver Incorporated, Stamford, Connecticut.





Check 1007 opposite last page.



CPI Makes Bid for Atomic-activity Increases

Look for a continuing exchange of letters between industry and the AEC over the question of private-industry participation in atomic-energy activities. And if industry doesn't get the increased business it wants, a likely next step is the Joint Atomic Energy Committee of Congress, and public hearings.

In separate letters to the Commission, the Manufacturing Chemists' Association, the National Association of Manufacturers, and the U.S. Chamber of Commerce cited specific examples of projects which could be handled by private firms, these spelling out just which government activities constitute competition with industry.

The CPI and others in the field feel that the time has now come for the Government to throw jobs within the AEC open to competitive bidding. The picture has changed since the Manhattan Project for the first atomic bomb.

In the beginning days of the atomic age, industry was not prepared to handle crash projects in the new area. But today, in both technology and facilities private firms are equipped to take over some of the projects from the Government.

In a combined answer to the three groups, for each of the activities they cited as competitive, AEC made comments, totaling 30 pages. A five-page cover letter summed up the industry examples in many cases as being "in areas of future activities in which we (the AEC) look forward to either initial or increasingly greater industrial participation on a commercial basis, while others generally fall into the following categories:

- Activities where industry is already engaged in the normal conduct of the work.
- Activities which are closely integrated with plant operation and, in accordance with accepted industry practice,

should remain integrated.

- 3) Activities where large volume is dependent upon military requirements and where extremely large plant investments have already been made by the government, or where the volume of activity is so small, sporadic and non-standardized as to make it impractical or uneconomical to contract for separately.
- Activities for which there is no known competitive commercial capacity."

Irradiated Fuel Elements

The Chamber of Commerce in its letter said that there is no reason to believe that many chemical firms could not handle the reprocessing of irradiated fuel elements if pricing, regulatory, and load problems could be successfully met. Both the Chamber and the NAM urged the AEC to bring private industry into the field of chemical reprocessing of irradiated fuel elements in the research and development stages.

The Commission replied that it has made a continuing effort to increase industry participation in this area. At the present time a group of five electric utilities and a chemical company (W. R. Grace & Co.'s Davison Division) are studying the feasibility of the "design, construction, and operation of a privately owned facility for the processing of spent nuclear fuels." The study, which is expected to last six months,

ALLIS-CHALMERS



has the full support of the AEC.

However, the Commission commented further that "to our knowledge there are no facilities outside of AEC capable of undertaking major development programs on recovery of spent fuel elements..."

Thorium

Industry may get some business from AEC in supplying thorium metal for various R&D uses. The AEC has no production capacity for the processing of thorium to metal. Current needs are supplied out of a small stockpile from a now-defunct pilot plant. AEC revealed that there may be a continuing requirement of thorium metal beyond its inventory. Should such a need develop, they will turn to commercial sources.

Specifically, MCA and NAM pointed to metal required for special projects at Los Alamos, Sandia, Lawrence Radiation Laboratory at Livermore and requirements for thorium oxide for homogenous reactor development at Oak Ridge. The three groups look for participation in fuel-element development and fabrication, and design and development of reactors.

Potentials

Industry listed many potentials in these two areas. For example, conversion and fabrication of fuel elements for the process heat reactor project to be built at Point Lomas, California, and for the nuclear-rocket program; conversion of all enriched uranium from UF6 as required in the "Nuclear Navy"; and production of uranium for the gas cooled reactor project at Oak Ridge, the heavy-water component test reactor being built at Savannah River and the new Hanford production reactor.

In general AEC answered that it is contracting out as much of this work as it can.

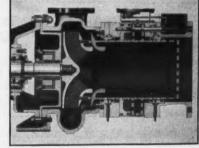
as it can.

To page 13

is related to the clearance between the ACAP cylinder (shown in orange) and the impeller. The pump can be adjusted automatically by means of a new internal pneumatic control system or by simple manual operation. Pump is available in any cast material.

For complete details, call your nearby A-C representative. Or write Allis-Chalmers, Industrial Equipment Division, Milwaukee 1, Wis.

ACAP is an Allis-Chalmers trademark.









Now for the chemical industry — Adjustable-Capacity, Adjustable-Pressure

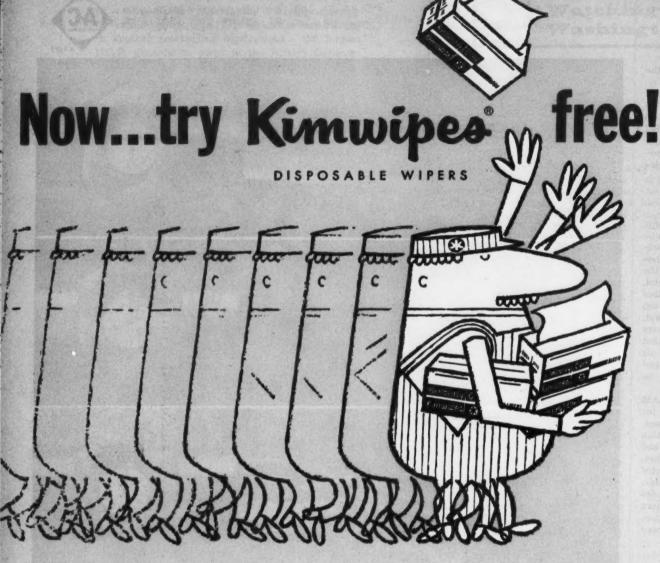
pumps regulate flow...without valves

Here's a pump that lets you regulate flow without changing pump speed and eliminates the need for valve throttling. It also improves mixing, reduces air binding, eliminates plugging and saves power.

It's the popular ACAP pump... tested and proved in many demanding industrial applications... and now available in sizes suitable for the chemical industry... capacities from 50 gpm, heads to 270 feet.

The change in capacity and head

Check 1008 opposite last page.



Mail the coupon today so that we can rush you your FREE box of 100 Kimwipes disposable wipers. Try Kimwipes in your plant to prove to your own satisfaction that they perform better than cloth towels in the processing of chemicals. Discover how they wipe cleaner, faster,

save workers' time. Check on Kimwipes' excellent pickup, conformability, superior wet-strength.

Super-sanitary Kimwipes pay for themselves in savings on towel laundering, alone! Available in handy pop-up packages or metal wall dispensers.

Kimberly-Clark Corporation

Dept. No. CP-40

Neenah, Wisconsin

Fill in this coupon, and mail it, today!

Please send me my FREE package of Kimwipes disposable wipers, Type 1300.

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By the makers of KLEENEX tissues ...

Kimberly Clark

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to fill in the slip with the other pertinent information: your name, title, company, product made, and address.

For more information on product at left, specify 1009 see information request blank opposite last page.



From page 11

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In those cases where private firms are not being used, it is because they have not wanted the work, the Commission said, or it has not been economical to use them.

The exchange of letters got started as a result of the recent Bureau of the Budget Bulletin No. 60-2 which directed heads of government agencies to look into their own activities in government-owned facilities to determine whether or not some of them could be discontinued or curtailed.

The MCA, the NAM and the Chamber of Commerce also made a study of the bulletin and concluded that AEC acceptance and implementation of the policy stated in the bulletin and review of its commercial-ind ustrial activities will go a long way "to strengthen free competition in private enterprise" (quote from opening declaration of the Atomic Energy Act).

Federal Policy

The policy stated in the Budget Bureau's bulletin is that "the Federal Government will not start or carry on any commercial-industrial activity to provide a service or product for its own use if such product or service can be procured from private enterprise through ordinary business channels."

The purpose of the bulletin is "to clarify the application of existing policy regarding competition between the Government and private enterprise..."

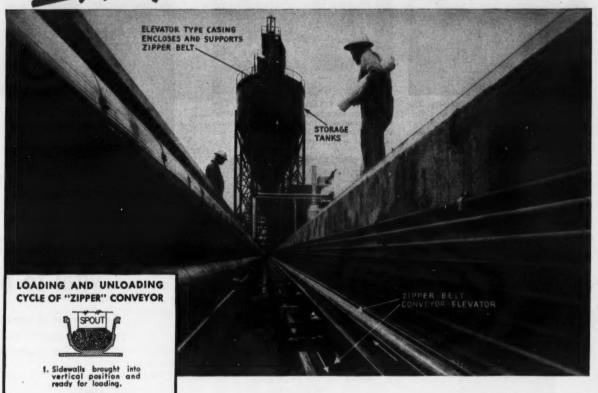
Now, though, one of the correspondents said, with industry looking over its shoulder, the AEC may think twice before "making a unilateral answer to a problem." As a result, some operations which might be carried on in government laboratories will now to a degree be given out to industry.

This set of communications is undoubtedly the beginning of an accelerating campaign by private industry to get more and more government-controlled business of this type open to competitive bidding.

STEPHENS-ADAMSON

"TIPPER"

CONVEYOR-ELEVATORS



CONVEYS AND ELEVATES BY CONTINUALLY WRAPPING MATERIAL IN A PACKAGE... MOVING THE PACKAGE AND ITS CONTENTS TO A NEW LOCATION AND GENTLY UNWRAPPING IT!

Literally a moving material-carrying conduit, the ZIPPER Conveyor is capable of transporting bulk materials in any plane, to considerable heights and around obstructions. Its great advantage is that bulk materials may be conveyed within the belt completely sealed and dust-tight. Material doesn't slide, isn't scooped, pushed or thrown but is gently carried over great distances without breakage, agitation or segregation. The ZIPPER Conveyor-Elevator provides versatility of layout and profitable material handling advantages you won't want to overlook.

want to overlook. *PATENTED WRITE FOR BULLETIN 349



PLANTS LOCATED IN: LOS ANGELES, CALIFORNIA . CLARKSDALE, MISSISSIPPI BELLEVILLE, ONTARIO



Flexible tube completely closed for conveying and elevating.

3. Rubber ZIPPER belt open for discharge, cleaning and return run.



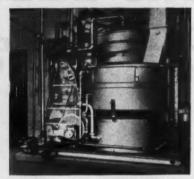
Upper left unit closed and loaded. Lower right shows how belt is opened and closed by system of ball bearing rollers. (Rollers are mounted on a rigid framework)

Check 1010 opposite last page.

3 BOILERS IN 1 COMPACT PACKAGE!



FOR ORDINARY STEAM REQUIREMENTS: The cycle-type Modulātic standard unit furnishes 90% dry steam for most ordinary needs such as cooking, heating water, drying, cleaning, etc.



WHERE DRY STEAM IS REQUIRED: The Modulatic may be used with an optional steam separator, for over 99% dry steam for heating, moulding, forges, operation of power equipment, etc.



14 the size and weight of conventional boilers...largest size (150 BHP) uses only 5' x 8' space.



IF CONSTANT STEAM LOAD MUST BE MAIN-TAINED: For applications where even a nominal drop in pressure cannot be allowed, an optional steam reservoir may be added to the standard unit to provide a "cushion" during an off cycle.

Efficient . . . economical . . . proved in thousands of installations all over the world! Vapor Modulatics furnish high or low-pressure steam (at design pressures up to 1000 psi, or even higher). Lowest installation costs—delivered completely assembled, wired and tested . . . all sizes (40 to 150 BHP) fit through plant doors, with no special foundations or special chimneys needed. Simple push-button operation; built-in safety controls. May be mounted in multiple units to provide for the largest steam requirements—without the inefficiency of idling larger single boilers as demand slackens.

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Please rush me your free bulletins on	Our requirements are:
Modulātic Water Tube Boilers.	BHP REQUIRED
NAME	SAFETY VALVE SETTING
TITLE	MINIMUM STEAM LOAD
FIRM	MAX. STEAM LOAD
ADDRESS	STEAM PRESSURE
CITY, ZONE, STATE	TYPE OF FUEL

Check 1011 opposite last page.

Why They Read CHEMICAL PROCESSING

One of a Series



Responsibilities of B. Wager, Chief Chemist, Mundet Cork Corporation, cover product development, quality and process control, trouble shooting and technical service. Reading is a must for him and CHEMICAL PROCESSING is high on his list

Chief chemist says CP vital to progress

Here's what CP reader B. Wager, Chief Chemist, Mundet Cork Corporation, has to say about CHEMICAL PROCESSING:

"I N 1948 I came across a copy of CHEMICAL PROC-ESSING while waiting in the lobby of a mid-western manufacturer. Since then I have read about 144 consecutive issues, usually from cover to cover. It's a great convenience to have current information on chemicals, specialties, equipment and new books all packed in one publication. The Reader Service slip helps me keep an up to date manufacturer's literature file with minimum effort. This information is vital to our progress."

Mundet Cork Corporation, with plants at Hillside and North Bergen, New Jersey, employs about 1000. Laboratories are maintained at both locations. Products manufactured include cork and synthetic rubber gaskets, crown caps and other closures, natural cork products and high and

low temperature insulations. Raw materials used range from asbestos for insulation to zein for cork binders. Further comments of Mr. Wager fol-

"My responsibilities as chief chemist cover product development, quality and process control, trouble shooting and technical service. Top management as well as our engineering, production, maintenance and sales people demand a variety of technical, scientific and economic information from the laboratory staff. We rely heavily on published facts and figures. Reading is a must and Chemical Processing is high on our list.

"I have a B. Chem. degree from Cornell University and have been with Mundet since 1935. My societies are the ACS, ASTM and Forest Products Research Society."

FISCHER &PORTER

THE HIGHEST POSSIBLE QUALITY

AROUND THE PNEUMATIC CONTROL LOOP WITH FISCHER & PORTER INSTRUMENTS

There are those who would have you believe our manufactory naught but the foremost maker of Flowmeters. But we cry, "Not So". And we have the courage to offer proof of an exceedingly extravagant nature to support our earnest denials. Proof, if you will, that the bonds of our PRODUCT LINE extend far beyond the limits of the estimable Flowmeter.

Envisage, Sirs, a "pneumatic control loop". Here, for example, we offer instruments to measure not merely flow, but also temperature, pressure, level, density, viscosity, and consistency.

Notice how Fischer & Porter devices are available to convert the diverse outputs of these many measuring instruments to clear and accurate pneumatic signals to be sent whistling through pipes to the heart of the loop...the control center.

Now note the multiplicity of Fischer & Porter instruments diligently performing their assigned tasks at the control panel. There are large and small case instruments with controllers tucked inside. There are miniature instruments with controllers riding piggy-back.

Surely, it beggars description. Yet this represents but a modest sketch of our line. For we are an INSTRUMENT COMPANY. And we pride ourselves on the availability of an instrument to fit every kink in the knottiest control loop.

Need we say more? Have we convinced you? Perhaps not!

But may we recommend that you spend a few precious moments with our Catalog Number Two? It is a brief presentation of our standardized instruments, and has won the hearts of instrument users everywhere. May we send you a copy for your own use?



COME ONE COME ALL COME ONE COME ALL TWICE THE TORQUE TWICE THE TORQUE NEW RELLOWS METER

NEW BELLOWS METER NEW BELLOWS METER

This astounding new addition to the Fischer & Porter line has amazed the populace. Wherever it has been exhibited it has occasioned the selfsame response. Strong men cry! Ladies faint!

Do you ask why? Find a comfortable seat and observe the reasons:

Does it have twice the torque of old fashioned styles? YES! YES!

Does it eliminate mercury, seal pots, purges, &c.? YES!

Does it require leveling? No!

Does it have full pressure rating overrange protection? YES!

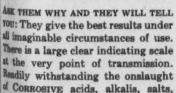
Does it control? Transmit? Integrate? YES! YES! YES!

Does it exceed all others of its style in workmanship, precision, and all-around worthiness?

Modesty, gentlemen, prohibits a response But your interest will be rewarded with satisfaction. Our work is our bond!

They Are All Buying F&P Temperature And Pressure Transmitters With The Fiberglass Case!

A CONTRACTOR A CON



solvents, &c., they are proof against degradation by Dust and Moisture as well. So they have proved themselves in actual operation and are pronounced by those who have used them The finest of their kind!



PULSATION OUTWITTED

by the FISCHER & PORTER DP TRANSMITTER

No more overdamping! No more underdamping!

No more zero shift! No more phantom signals! No more diaphragm fatigue!

No more premature replacement!

This popular differential pressure transmitter undeniably supports its claim as being the best in the world! Ever since it was first presented to the public its success has been little short of remarkable. Why? It must be that its superiority over all others is substantiated by the FACTS OF ACTUAL USE!

AMAZING ADVANTAGES found in no like instrument

Adjustable damping in the differential sensing system, Gentlemen, which is where it should be. We warrant there to be no other method that insures you the fastest response, eliminates extraneous forces, and wipes out signal noise!



- Process fluid Cannot contact any critical part whatsoever. A perfectly sealed measuring chamber filled with the celebrated silicone oil PROTECTS ALL WORK-ING PARTS.
- Its operation requires No MER-CURY! And it is a rugged, sturdy, all-metal structure that will serve you well in every respect through the years.

what will they think of next? they will think of the

53P CONTROLLER

that is what they will think of next



- A true TRIPLE-THREAT controller! The same unit is used in large case instruments, plugged into miniatures, and in field mounting. TRUE standardization!
- In the most fastidious of processes it is an HONORED GUEST.
- Let this fine instrument speak for itself.
 But be advised that it SPEAKS IN A WHISPER, for it has a non-bleed type amplifying relay.
- It has the simplicity of motion balance design, which combined with the amaing REGENERATIVE FEEDBACK...provides the performance of force balance design

miniature miniature

its roller		
TITLE:		
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	roller	roller



state your pleasure, gentlemen!

To better acquaint our far reaching public with the BENEFITS and ADVANTAGES of our products on have caused to be printed handsome booklets for the general edification. We will gladly post to you a selection of these works upon your application. Make a selection at your leisure from the list below. Sign your anneal and address in the generous space provided, and sent it to us. We are your obedient servants in this as a all other matters.

Fischer & Porter Co., Warminster, Pa. Dept. 24



it's again at Cal-Spray's nnewick Plant

"... beyond expectations"

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was the way Cal-Spray described their new nitric acid and ammonium nitrate facilities recently designed and constructed by C&I at Cal-Spray's Kennewick, Washington fertilizer plant. Both the nitric acid and ammonium nitrate plants went on stream according to schedule and operated in excess of their rated capacities.

Also under construction for Cal-Spray is their new complex fertilizer plant designed and now under construction by C&I. It is due to go on stream in the spring of 1960.

If you are considering expansion of present fertilizer facilities or are contemplating new locations, it will pay you to consult C&I.

Representatives in principle cities of the world.

ammonium
nitrate plant.
Design incorporates C&I's
new short
prilling tower
which produces
150 tons per day
of a superior
prill from a
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Complete Plants

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prevents galling
prevents seizing
protects valuable equipment

GOOP is the amazing new compound for ending the costly galling, seizing and resultant destruction of threaded parts.

The line includes three separate products: Blue GOOP, Silver GOOP and High Purity GOOP.

Silver Goop is formulated to prevent seizing and galling of threaded parts, regardless of applied load, at temperatures up to 2100 F. It reduces take-up torque on threaded parts. Will not drip off red-hot surfaces nor give off poisonous metal or oxide fumes at high temperatures. Resists water washout.

Blue Goop is an anti-seize and sealing compound, for use on titanium, stainless steel, steel, aluminum

and high temperature alloys. Withstands temperatures up to 400° F. Impervious to water washout, most acids and all petroleum solvents.

High Purity Goop is an anti-seize and sealing compound for litanium, stainless steel, steel, aluminum and high temperature alloys, Withstands temperatures up to 400° F. Impervious to maisture, high voltage and cyclic thermal stress. Recommended for use wherever prevention of product contamination is an important factor.

CRAWFORD FITTING COMPANY

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Cleveland 10, Ohio

Crawford Fittings Canada Ltd. Niggara Falls Ontario Canada

BUSINESS / Our Growing Industry

Penn-Olin Chemical Formed To Produce Sodium Chlorate

Penn-Olin Chemical Company has been formed as a joint subsidiary of Pennsalt Chemicals Corporation and Olin Mathieson Chemical Corporation. This \$6.5-million venture is intended to produce sodium chlorate and other chlorate compounds. Preliminary engineering has been completed on a 25,000-ton/yr plant at Calvert City, Kentucky.

Sodium Chlorate is an increasing demand for generation of chlorine dioxide in the pulp and paper industry, and also as

a major raw material used in production of ammonium perchlorate, a solid rocket fuel oxidizer. Sodium chlorate can also be used in manufacture of defoliants and wheat killers. Subsidiary will be equally owned by the two corporations.

The Dow Chemical Company plans a major expansion of polyethylene capacity at Freeport, Texas. New facilities will increase production by approximately 67%. Completion is expected in 1961. Company has also announced plans for major increase in styrene monomer capacity, bringing total to more than 800 million lb/yr. Completion is expected late this year or early 1961 and involves both the Freeport, Texas, and Midland, Michigan, locations.

Company also plans construction of a plant to manufacture Nylon 6 at Williamsburg, Virginia, with an initial capacity of 12 million lb/yr of filament yarn. Kalama, Washington has been selected as a site for a Phenol plant. Capacity on this plant will be 35 million lb/yr. These industries should be finished in 1961.

Catalin Corporation of America has begun full-scale production at its ten-millionlb/yr acrylic plant at Fords, New Jersey.

Koppers Company, Inc. and Sinclair Oil Corporation have jointly announced plans for a plant at Houston, Texas, to produce styrene monomer. Sinclair-Koppers Chemical Company will be formed to own and operate the plant

scheduled to be completed by middle of 1961. Capacity was estimated to be 70 million lb/yr.

Koppers also plans to construct a new de-sulfurization unit at Follansbee, West Virginia. Unit will have a yearly production capacity of 60 million lb of virtually sulfurfree naphthalene. Present schedules call for plant to be completed and in operation by the end of this year.

Stauffer Chemical Company is expanding chlorine-caustic plant at Henderson, Nevada. Expansion will increase output by about 25%.

Barium and Chemicals, Inc. has announced start of expansion program to greatly increase facilities for production of high-purity barium and strontium compounds.

Allied Chemical Corporation has doubled facilities at Toledo, Ohio, for melamine and urea molding compounds. Full-scale production of 45 million lb will probably not be reached until late this year.

Jefferson Chemical Company, Inc. has purchased extensive chemical manufacture facilities at Conroe, Texas, from Gulf Oil Corporation. In addition to morpholine, intermediates developed for use in the polyurethane resin industry and specialty surfaceactive agents will be produced at Conroe plant. It will be onstream by mid-year.

Cosden Petroleum Corporation will strengthen its posi-To page 19

HOW TO educate



a drop of oil!

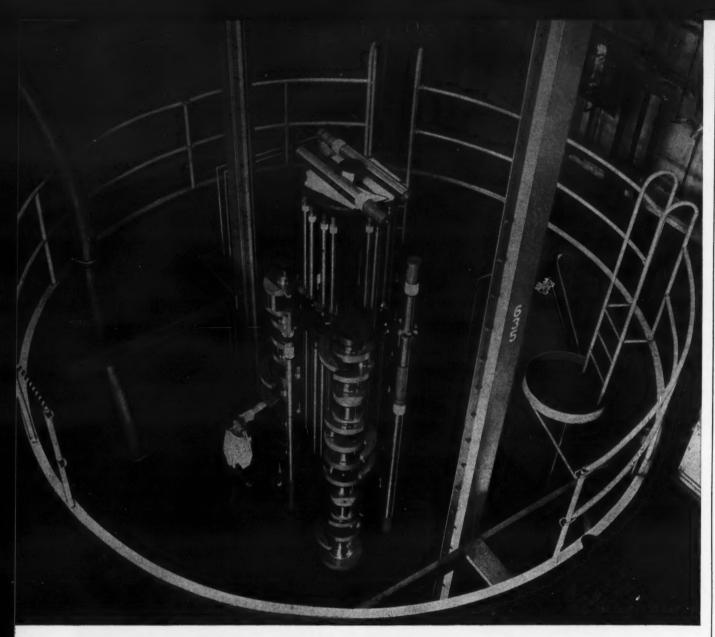
Just put it through a Manzel force-feed lubricator and any oil drop knows where it's going and how to get there fast. Manzel lubricators deliver just the right amount of oil to bearings, cylinders and packings. They start, stop, speed up and slow down in perfect synchronization with your machinery...unaffected by high steam, gas or air pressure. Whatever your field, there's a Manzel lubricator to meet

your needs. For our catalog, write Manzel, 251 Babcock Street, Buffalo 10, New York. Whatever your lubricating problem, you get the right answer if you





Check 1015 opposite last page.



WHO FORGES THE TOUGH ONES?... and nitride-hardens them, too?

National Forge does it—with a nitriding installation that is one of the largest and most modern in existence. Now diesel crankshafts, pump eccentrics, compressor pistons and rods, gears, marine couplings, and many other machinery parts are not only *forged* at National, but *nitride-hardened* to add strength and reduce wear. Vertical nitriding furnaces like the

one illustrated will accommodate forgings up to 16 feet in

National Forge also has its own basic electric melting facilities and produces all the usual types of nitriding steels, including the recently developed 5% nickel, 2% aluminum grade. For further information, write for bulletin NH-1058.



NATIONAL FORGE COMPANY

IRVINE, WARREN COUNTY, PENNSYLVANIA

LOST YOUR SLIDE RULE?

Then CP's Processing and Engineering Data Section is for you.

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Each month, this section contains time-saving nomographs, tables, or charts which other data savers have found extremely useful in speeding calculations. Perhaps, you will find them to be of value to you.

A wide variety of information can be found in this section. So no matter what your particular field you will find suitable data to aid you in your daily work.

And -

the section pages are designed to fit easily into regular data files.

Keep them handy for use in making quick calculations in the plant or office.

Just cut along the marked edge, punch as indicated, and insert them into your notebook.

so —

be sure not to miss this month's "Data Section." It begins on page 61.

For more information on product at left, specify 1016 see information request blank opposite last page.



From page 17

tion and fast-growing petrochemical market with erection of facilities to triple its styrene capacity at Big Spring, Texas. When completed late this year, expansion will bring capacity to 60 million lb/yr. Expansion, being engineered and constructed by Badger Manufacturing Company, will utilize Universal Oil Products Company's Alkar process for ethylbenzene manufactured through catalytic alkylation of benzene with ethylene.

Company also plans to expand facilities for orthoxylene. After the facilities are completed early in 1961, production will be in excess of 70 million lb/yr.

Ethyl Corporation has announced that a plant for manufacture of vinyl chloride monomer will be built at its Houston, Texas, manufacturing center. Completion is scheduled for early 1961.

Reilly Tar & Chemical Corporation is doubling capacity of synthetic pyridine plant with completion scheduled during the fourth quarter of this year.

Monsanto Chemical Company has begun construction of facilities for manufacture of various alkyl phenols at Kearney, New Jersey. Plant is scheduled for completion in September.

B. F. Goodrich Chemical Company has construction underway for a plant to produce vinyl resins and compounds, near Long Beach, California. This is company's first plant west of the Mississippi.

Phillips Chemical Company will construct a 60-million-lb/ yr carbon black plant four miles northeast of Orange, Texas. Completion is scheduled for late this year.

Hooker Chemical Corporation plans to invest about \$10 million to increase production capacity of caustic soda, caustic potash and chlorine at its Niagara Falls, New York plant. Expansion, designed to





HYDRAULIC SCOOP... for handling loose materials can be furnished as a

REMOTE CON-TROL MAST per-

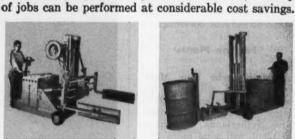
mits operator to ride up and down for order picking or maintenance

work by pushing

button on carriage Platform folds back to permit normal



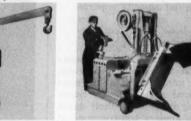
arms can be attached to forks for handling cartons, etc. Clamp arms can be removed to handle pallets.



MECHANICAL GRAVITY DRUM **DUMPER...Removable** attachment fit on forks.



MENT...for items too bulky or too irregular in shape to be palletized.



job flexibility to your Transporter Stacker, Now, a variety

REVOLVING PAPER ROLL CLAMP ...handles rolls vertically or horizon-tally...revolves 360° right or left.





CABLE REEL HANDLER ... lifts and

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4		HE SO
		HYDRAULIC DRUM HANDLER
		picks up and carries anystandard drur

First in Imagination... irst with Reality

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Descriptive litera	ture on special attachment for the following type

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meet steadily increasing requirements for these chemicals, will utilize Hoechst-Uhde mercury electrolytic cells. Cell installation should be completed by late Spring of 1961.

Union Carbide Nuclear Company Div. of Union Carbide Corporation has announced completion of a unit for producing high-purity ammonium paratungstate. Bishop, California, installation is an extension of refining stage already in operation.

Foreign Plants

Nederlandsche Dow Maatschappij N.V. will build and operate a styrene-butadiene latex plant in Rotterdam, The Netherlands. Investment in plant will total more than \$7.5 million Dutch guilders (\$2 million). Completion is scheduled for early 1961 with an initial capacity expected to cover increasing styrene-butadiene latex requirements of Western Europe.

Great Lakes Carbon Corporation will produce filteraids and mineral fillers for continental and northern European markets in their plant now under construction in Ghent, Belgium. Dicalite Europe Nord S.A. has been organized to handle plant operation and sales. Ultimate operational plans call for the employment of approximately 100 people.

Oronite Chemical Company is entering into a joint venture with Antar Petroles de l'Atlantique and Societe' Progil in France to produce paraxylene. Multi-million-dollar plant, scheduled for completion by late 1960, will be built at Donges, on the Loire River near St. Nazaire. Company now being formed to build and operate the St. Nazaire plant will be known as Societe' Californie-Atlatique.

Quimica Mexama, S.A., has been formed by group of Mexican investors in partnership with Miles Laboratories, Elkhart, Ind. Immediate plans call for construction of \$1.5million production plant near Mexico City.



GP

whatever your process requirements

COMPRESSOR

exactly right for your needs

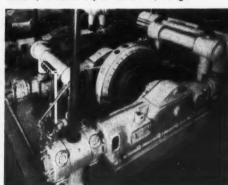
The Class FE horizontal, balanced-opposed compressor is built in a wide range of combinations of crankthrows, cylinder arrangements and stages for pressures up to 15,000 psig; sizes up to 5,000 hp. One such combination is shown at the left.

Other CP Compressors from $7\frac{1}{2}$ hp belt-driven vertical single-acting to 2,000 hp horizontal double-acting with belt, steam or direct motor drive.

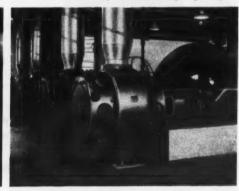
Chicago Pneumatic & Eust 44th Street, New York 17, N. Y.

Air and Gas Compressors · Vacuum Pumps · Pneumatic Tools · Electric Tools · Diesel Engines · Rock Drills · Hydraulic Tools

Class H, horizontal duplex four-corner, 4-stage.



Class O-DE, horizontal duplex, double-acting single-stage.



Check 1018 opposite last page.



letters from readers

Depreciation (cont)

Sirs:

I've been following your depreciation series, and was quite concerned by Mr. Davis' original article (Sept. CP, p. 30). However, I was concerned more for Mr. Davis than for the so-called ills of our system.

I congratulate Mr. W. E. Kress of Shell Oil (a production man, by the way) who I believe has come closest to the problem and its solution (Oct. CP, p. 143). Also, Mr. D. W. Lanning, who was close in his conclusion (Oct. CP, p. 143). The yell for a change in how we can depreciate is fighting the bark instead of the dog.

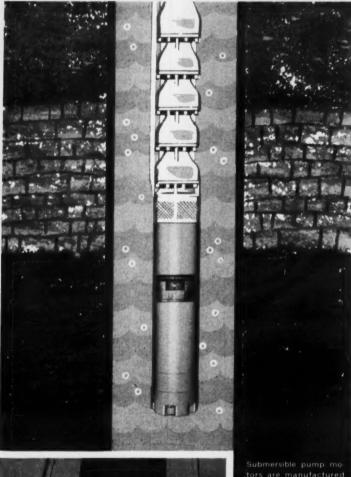
Depreciation, or fixed-asset amortization if you prefer, is the writing off of what we have, not the preparation for what we think we might have sometime, maybe and if. That will be written off after we have it. If the consumer doesn't pay the tax to the Government through the manufacturer's product cost, he will pay it directly; but pay it he must

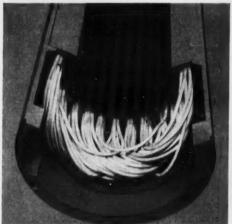
Du Pont's problems are Dow's problems; Shell's problems are Esso's problems; Proctor & Gamble's problems are Colgate-Palmolive's problems. How can one company gain an advantage over a competitor with the present system? The real problem is government spending, not how to make life easier for controllers.

I can picture a company that has a piece of stainless steel and wants to increase deductable depreciation because the cost ten years from now is to be \$5.00 more than it was ten years ago, when it was purchased. Uncle Sam sends in an expert, and he says that for this purpose you can now use PVC which will not cost any more. Then the battle starts.

Or, perhaps he allows the increased depreciation. Ten years later the company replaces the stainless with some new plastic costing less than the stainless did originally. Does the company then make a lump-sum adjustment to the

B.F. Goodrich Chemical saw materials







Problem of motor submersion solved with Geon insulation

This new motor operates under water using the water itself as a lubricant. Since the housing is water filled and "breathes" well water, its operation depends on the insulation of Geon.

Geon met tough requirements. The manufacturer says that many materials were tested to find one that would stay waterproof indefinitely and also have enough mechanical strength to stand up under the winding process and under flexing imposed in starting.

A test motor was submerged under 400 feet of head for six months and subjected to frequent starting and operation. At the end of the test, the Geon insulation showed no signs of deterioration. Geon also eliminates need for thick and dense coatings over end turns—eliminating a cause of trapped heat and premature failure.

Here's another example of the way that Geon vinyls open new markets, or improve present applications. For more information, write Dept. GO-3, B.F.Goodrich Chemical Company, 3135 Euclid Avenue, Cleveland 15, Ohio. Cable address: Goodchemco. In Canada: Kitchener, Ontario.



B.F.Goodrich Chemical Company a division of The B.F.Goodrich Company



GEON vinyls . HYCAR rubber and latex . GOOD-RITE chemicals and plasticizers

Government for the over-depreciation they have been taking?

Let's not further complicate an already complicated system. If we are to worry, we should worry about government spending, and then do something about that. What should we do about it? This is the main question.

> LAWRENCE J. KIRK Eatontown, N.J.

Chlorinated xylenes

Sirs

I would like to call your attention to an error in the article, "Chlorinated Xylenes Show Promising Future," beginning on page 37 of the February 1960 issue. On page 40, under the heading "Polycondensation," the reaction should be as indicated below:

The reactions quoted above show that the oxidation of 2-chloro-p-xylene to 2-chloro-terephthalic acid is a two-step process.

DR. GEORGE F. RUGAR
Manager
Product Development
Department
Diamond Alkali Company
Painesville, Ohio

BUDGET BLUES??

Is production bogged down because the old mill should be down by the stream instead of reluctantly on stream in the plant contributing to your problems? Would a nice shiny new mill solve all of your problems except the big one-how to find the money for it in your budget? Then a slightly used mill, such as you'll find listed along with various other useful equipment in CHEMICAL PROC-ESSING's Classified Section, could be the answer to your problem.

Prelude to Process Dynamics . . .

Present-Day Computer Control

CHARLES D. CLOSE CompuDyne Corporation Hatboro, Pennsylvania

Mr. Close is president of CompuDyne Corp. Starting as an electrical engineer, the major part of his career has been in the control field. He is the author of a number of articles and papers on control subjects.

N EW plants patterned after designs continuously repeated for years are often stumbling blocks to use of computer control. Application of control mathematics to the process design often points up weaknesses that should first be explored in pilot plants. By doing only this a greater payout contribution may be made than can be expected from use of the computer under consideration! Then again, a well disguised process fault properly re-engineered in the job rework, may be the nugget of gold to improved payout discovered when the more rigorous investigation of the process was made, during justification of computer control.

Whatever the payout improvement, the rigor with which we must look at our process design to determine parameters for computer control is an indirect benefit of improving unit process design.

The computer as a new control element is just another building block of unit operations control equipment with

specific functions. It is necessary, however, for us to know where to use computer control and what benefits we will receive.

If we generalize the computer's uses, these can be broken down into three major areas:

Computer Use No. I -More Comprehensive Computation

Today's plants are run from two or possibly three sets of operating guides. These will be mentioned in order of their availability. First set of operating guides is condition of temperature, pressure, flow, liquid level, and, in some cases, analytical measurements maintained at steady state inputs of processing. Except for the criteria of certain analytical on-stream measurements which may be an indication of product quality, set-points of operating control points are guide lines only to make a product of suitable quality and quantity. Most of these operating control points, when held constant, will result in uniform product if:

- a) ambient conditions around process do not change:
- b) raw material remains fixed in composition;
- c) catalyst or process equipment does not show a drop in efficiency; or
- d) any other factor which

influences product yield does not vary.

It is not necessary to discuss the operating control point problem with regard to the desire to modify operating guides to some new set of values for varying product analysis. To reduce or eliminate effects of these variations in the last two years, new plants and revisions of old plants have used computers to yield more comprehensive operating control points which have included many of the changing conditions of process. Costs of such a comprehensive computation vary with the complexity of the computation and the desired flexibility of the computer.

Digital computers and analog computers and combinations of both have been used to obtain these computer operating control points.

To illustrate this, fractionating columns have been placed under direct resetting control of operating points via measurements of bottom and top tower temperature as resetting criteria of flow of input1. Humble Oil has reported a second fractionating computer control that has been in operation since last year.

Second set of operating guides comes from the analytical laboratory. Usually there is a several hour lag before this information trickles back to influence changes of control points; however, stream analyses are becoming an integral part of the inner computer control loop as many reliable on-stream analytical instruments have been developed to replace laboratory analysis. Many computer justifications are being held up today for want of a prompt measurement of product quality.

Third set of operating guides comes from supply of raw material and demand of product. Factors of cost and sell price, composition of raw material and product specification determine these criteria.

These second and third considerations will be more useful to computation for control as time lag of receipt of information through processing time of desired operating points is shortened. A number of companies are continuously programming market conditions into a mathematical model of plant to determine production parameters. As these programs become more complete, they will become resetting commands to unit operating points.

Computer Use No. II -**Continuous Computation**

For years the control industry has made available pneumatic and, in recent years, electronic controllers for closed

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¹Lupfer, D. E., Berger, D. E. ''Computer Control of Distillation Reflux,'' ISA Journal, June 1959, pp 34-39.

GAGE:

Turn-key Contracts
Stifle Creativity

Time To Take A New Look At Operator/Contractor Relations

SAYS PANEL OF INDUSTRY EXPERTS



JOHN A. HUFNAGEL is New York Manager Catalytic Construction Co., Philadelphia, Pa.

MODERATOR HUFNAGEL:

Why Concern About Operator-Contractor Relations?

E conomy, safety, and operability are the watchwords of today's engineering contractors. These have arisen from the needs of the operating company customers. Newly developed techniques of methods, planning and scheduling, model building and others are providing improved services. Such have, however, given rise to new problems between contractors and their customers, problems which

can benefit from such discussion as is given in the following statements by experts in the field of engineering construction.

One of these problems lies in the domain of corporate policies — now seen more clearly to be alterable when consistent with sounder management practices.

Another has to do with the kind of contract which should be drawn. An ever recurring problem, it takes on special significance in today's competitive circumstances. Financial practices of client, size of engineering staff, nature of work and confidential requirements of the client are all factors contributing to the answer for each case. One would not consider the same type of contract for designing and building a conventional refinery crude unit, as one would for the engineering and building of a plant to manufacture one of the new, complex and high profit synthetic polymers. For the distillation unit, a lump-sum bid is easily arrived at. Product specifications can be readily met, the

materials of construction and the process are well known. On the other hand, the polymer plant is probably fraught with uncertainties. Laboratory data may still be anticipated which will modify the engineering. Scale-up may be an acute problem; amount of sparing another. In such a case a lump-sum bid may be completely unrealistic. The final cost is almost always negotiated after the facts are clear. In such a case, a guaranteed maximum contract is best.

In general, the higher the profits anticipated from a new plant, the more valuable will be time-saving contract provisions.

The following statements, which try to provide answers where answers are possible, are by authors who have had long experience with contractors. Combined, these men have been responsible for placing, directing and/or administering projects totalling hundreds of millions of dollars worth of new chemical and oil plants. And when such sums are involved, experience counts!

FORBES:

Outdated Methods Have No Place in Today's Operations

KNIGHT:

Guarded Secrets Hamper Contractor

FORBATH:

Role of Construction Industry in Cyanamid's Operations The basic concept behind building a plant is that its owner wants it to manufacture a product at a profit.

Most market-minded managements know that the company which is first in a field is able to establish the firmest beachhead. Such a company has its new product on the market and gets its sales and technical service oriented and operating before some or all of its competitors have also reached the same customers. This lead time is analogous to

the early bird maxim.

Getting the plant built quickly is one of the most important aspects of custom-er-contractor relations.

In buying a turn-key job the major advantage is that you know exactly what you are supposed to get. However, the turn-key plant has these major disadvantages:

Turn-key Time Consuming

A large engineering staff of your own is needed to prepare a turn-key job specification book unless the plant is to be a "Chinese copy" of previous plants. It is needed also to check bids and make sure every detail has been included and that the contractor has not made mistakes or errors in judgement that would in effect result in a bad bid.

A long waiting time is necessary to enable the contractor to obtain exact quotations on every piece of equipment in the plant. This might take

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WILLIAM P. GAGE
is President, Research Division
W.R. Grace & Co.,
New York City

For an engineering contract to be successful there must be certain basic elements in the relationship between contractor and customer. Any contractural venture is a joint one. The philosophy of working shoulder-to-shoulder must permeate and be practiced by both parties. Mutual confidence must underlie all activities.

The contractor has the right to assume the customer knows what he wants. He expects the customer's confidence in his ability to perform, and that the customer will recognize that he will do his best to obtain a satisfactory end result.

The customer, on the other hand, should be able to feel that his interests will be protected, that the contractor is capable, and will assume more than a passing interest and responsibility in the execution of his work. He must have every assurance that the contractor will provide a good alert organization to carry out

the contract to a satisfactory conclusion.

Ideal Situation

That the customer has a well defined project before engaging a contractor indeed is an ideal situation. Nevertheless, a contractor does hope that this is so. Since any project is governed both timeand dollar-wise, perhaps one of the bitterest facts that a customer must face is a com-

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GEORGE P. FORBES is Head, Construction Section, Shell Chemical Co., New York City

Speaking as a contractor, I think the basic thing a customer should consider in selecting a contractor is his honesty, integrity and reputation for doing quality work. After he has a good, efficient contractor, he should let that contractor make proposals on the basis of experience developed over the years in business, plus the specialized training of the contractors' personnel.

Many operating companies seem to feel the best place to

start their young engineers is checking a contractor in the field. I am speaking of this from experience because at age 21, my operating company employer put me in the field. and I hate to think of what I insisted the contractor do, reflected in the practical experience gained since then. I am sure none of the contractors object to rigid inspections the tougher the better - provided the client's representative is someone with practical experience, understands exactly what is being built, what it should do after it is built, and is able to talk intelligently to the contractor's people.

Always difficult to understand is jealous guarding of process know-how from the contractor. A reputable contractor would only once have to violate any such confidences and such violation would be immediately known throughout the industry. In my 40 years' experience, I have never heard nor read of a con-

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ALAN T. KNIGHT
is Executive Vice President of
Catalytic Construction Co.,
Philadelphia, Pa.

When Cyanamid's Engineering and Construction Div. was organized, there was no intention of establishing a large enough group to take care of all detailed engineering needs for design and construction of major facilities. We did want to have an integrated engineering organization, however, in which all the various engineering skills required for proper design of complex "grass roots" chemical plants

were adequately represented. Since we are in the chemical business and expect to continue to build many "first of their kind" processing plants, our emphasis was heavy on chemical process engineering. We did not and do not intend to handle any of our own construction work. Our Construction Department consists of experienced construction engineers who act as our field liaison representatives with construction contractors. We

intend to continue to rely on qualified outside engineering and construction firms. In this manner we do not have to maintain a staff which would be too large when major plant expansion programs slow down. On the other hand, we can design a complete new chemical plant if the company's best interests would be better served than by farming it out.

We are determined to take

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THOMAS P. FORBATH
is General Manager
Commercial Development
Division
American Cyanamid Company
New York City

Antidumping Act

- protection without coddling

JAMES POMEROY HENDRICK Assistant to the Secretary of the Treasury

> There is nothing really complicated about the Antidumping Act. There are, however, many misconceptions about this law. Mr. Hendrick undertakes to clear the air surrounding the provisions of the Act, explaining what it is and what it is not



JAMES POMEROY HENDRICK is an Assistant to the Secretary of the Treasury. He was educated at Yale and Corpus Christi College, Cambridge. After twelve years of law practice in New York City with the firm of Winthrop, Stimson, Putnam & Roberts, he came to Washington in the spring of 1941 to do special work for the War Department.

Following the outbreak of hostilities he was commissioned as an officer in the Army, and rose to the rank of colonel in the Ordnance Department. At the conclusion of hostilities he served as an assistant to Secretary of War Robert P. Patterson. Thereafter he held various government positions in Washington, Paris, Hanoi and Seoul, joining the Treasury Department in December

The Antidumping Act devotes several thousand words to its definition of dumping. This can be boiled down to the following: Sales to the U.S. which (a) are below foreign home price and (b) injure American industry. A typical example of such a situation, as far as pricing is concerned is shown by Ex-

Since the foreign home price is \$1.00 and the price to our country is \$0.90, the first test of the short definition is met. If there is also injury to American industry, dumping, within the meaning of the law, has occurred.

ample (A) of Table 1.

There can be cases in which sales for exportation to countries other than the U.S. (generally described as thirdcountry sales) are in far larger quantity than the foreign producer's home sales. If this is the case, the short definition of dumping must be amended to read: Sales to the U.S. which (a) are below thirdcountry price and (b) injure American industry.

Such a situation, as to price, is shown in Example (B) of Table 1. Here the second column, representing threequarters of all the foreign

TABLE 1*

Sales for consumption in country of exportation (foreign home price)

A) 75,000 units @ \$1.00 B) 25,000 units @ \$0.95

Sales for exportation to countries other than U.S. (third-country price)

Sales to U.S.

25,000 units @ \$0.85 15.000 units @ \$0.90 75,000 units @ \$0.90 15,000 units @ \$0.90

TABLE 2*

Sales for consumption in country of exportation (foreign home price) 200,000 lb @ \$0,85

for each sale Units of 100 lb

Quantity

Sales to U.S. 100,000 lb @ \$0.80

Quantity for each sale Units of 1000 lb

100,000 lb @ \$0.80 Units of 1000 lb

*Examples are from Customs Regulations (19 CFR 14.7, Footnote 15).

producer's non-U.S. sales, becomes the benchmark for deciding whether or not there is dumping as to price. This third-country price is identical with the price to the U.S. Therefore, no basis exists under the law to proceed further with the case, even though the imports may injure American industry.

Example (B) provides a typical guide for judging whether or not to use foreign home price or third-country price as a basis. There is no hard and fast rule. However, in all recent dumping decisions, foreign home price has been used only where such sales constitute more than 25% of all non-U.S. sales over a representative period.

Inevitably cases will occur in which the imported product is not sold in either the foreign home market or in third countries. In such instances, the test is whether or not the product is sold below constructed value. Constructed value is an estimate of cost plus profit, with the proviso that profit must be at least 8% and overhead at least 10%. The short dumping definition under these circumstances: Sales to the U.S. which (a)

are below cost and (b) injure American industry.

Procedure: the complaint -On occasion complaints such as this are received.

Dear Sir:

There is a company in country X sending in this product at an outrageous price. They can't do this to me! I want protection under the Antidumping Act.

> Respectfully yours, JOHN DOE

P.S. I hate these lousy foreigners and demand an embargo on all imports.

J.D.

Now this is not a sufficient complaint!

If an American producer thinks he has an actionable case, the Commissioner of Customs in Washington should be sent a detailed description or sample of the imported product in question. Information as to foreign home price or third-country price or cost (whichever is believed to be

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What's Your Company's 'Diversification Coefficient'?

How well does a company's program of diversification achieve its goal of sales stability? This depends on the maintenance of an optimum balance between variety and minimum cost. Mathematical analysis of key variables affecting diversification results in a standard, against which sales performance can be measured

CARL PACIFICO

Vice President American Alcolac Corporation

Diversification is a favorite subject in the chemical industry these days. The validity of the need for it is considered as unassailable as "motherhood." Such an attitude effectively blocks creative thinking on this important subject. Diversification may be exactly what a company needs, or it may be a Lorelei call—luring a company to destruction on the rocks of a new

venture, when it could have better spent time and effort in making present activities safe from attack.

The concept of diversification had its inception when progressive managements decided to divide their efforts in order to gain better stability of sales and profits. They were fully aware that this increase in safety had its price—usually payable in reduced efficiency.

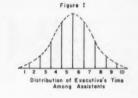
Many erroneous connotations have since become attached to this fundamentally sound concept. Sometimes

"diversification" is used to mean "growth". Even more serious, it is often equated with "variety" (with the further implication that if a little is good, more is better).

Followed to its ultimate, use of the latter definition would result in sales of one pound of many different products, each to a different company. Therefore there must be some indefinite area of diminishing returns, beyond which good diversification retrogresses into dissipation.

The goal of diversification is stability of sales. Good diversification can be defined as the optimum balance between the divergent principles of variety and minimum cost.





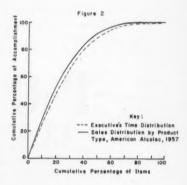


			TABLE 1		
A	ssistants	% of Total Assistants	Time Obtained, %	Cumulative Time, %	Cumulative % of Assistants
5	and 6	20	45.2	45.2	20
4	and 7	20	31.8	77.0	40
3	and 8	20	15.8	92.8	60
2	and 9	20	5.6	98.4	80
- 1	and 10	20	1.6	100.0	100.0

TABLE 2

Distri										
	1	2	3	4	5	6	7	8	9	10
	100	88	71	58	48	40	34	31	28	25
		12	26	30	32	29	29	27	23	22
			3	10	16	20	19	19	20	19
				2	3	8	11	12	14	14
					- 1	2	5	6	7	9
						1	1	3	5	5
							-1	1	1	3
								1	1	- 1
									1	- 1
										1
	each Item	each Item 1	each Item 1 2 100 88	each Item 1 2 3 100 88 71 12 26	each Item 1 2 3 4 100 88 71 58 12 26 30 3 10	each Item 1 2 3 4 5 100 88 71 58 48 12 26 30 32 3 10 16	each Item 1 2 3 4 5 6 100 88 71 58 48 40 12 26 30 32 29 3 10 16 20 2 3 8	each Item 1 2 3 4 5 6 7 100 88 71 58 48 40 34 12 26 30 32 29 29 3 10 16 20 19 2 3 8 11	each Item 1 2 3 4 5 6 7 8 100 88 71 58 48 40 34 31 12 26 30 32 29 29 27 3 10 16 20 19 19 19 19 2 3 8 11 12	each Item 1 2 3 4 5 6 7 8 9 100 88 71 58 48 40 34 31 28 12 26 30 32 29 29 27 23 3 10 16 20 19 19 20 2 3 8 11 12 14



CARL PACIFICO joined American Alcolac in 1954 after activities in market development at Wyandotte Chemicals. He has pro-gressed with the growth of the company to the position of vice president and general manager. Mr. Pacifico graduated from Drexel Institute in 1943 with a B.S. degree in chemical engineering.

PLASTICIZERS FROM CELANESE

-P=0

LINDOL: Tricresyl phosphate, low color. Low volatility, good resistance to extraction by oils, superior color. Standard for vinyls and cellulosics.

CELLUFLEX 179A: Tricresyl phosphate, low specific gravity. Lowest ortho content commercially available.

CELLUFLEX 179C: Tricresyl phosphate, general purpose grade. Excellent solvent power and flame retardance. Low volatility. For coatings and films demanding

toughness and flame resistance.

CELLUFLEX 179EG: Tricresyl phosphate, electrical grade. To make plastic insulations.

Offers flame resistance, outstanding electrical properties, low weight

per unit volume.

CELLUPHOS 4: Tributyl phosphate. Plasticizer for resins and rubbers. Foam

depressant. Selective solvent.

CELLUFLEX TPP: Triphenyl phosphate. Excellent fire resistance, good flexibility. Produces

clear, tough compositions. Widely used for cellulose acetate.

CELLUFLEX 112: Cresyl diphenyl phosphate. High degree of flame resistance in vinyl formulations. Improved low temperature and light exposure properties.

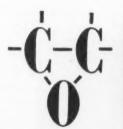
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CELLUFLEX CEF:

Tris beta-chloroethyl phosphate. Exceptional flame retardance.

CELLUFLEX FR-2:

Tris dichloropropyl phosphate. Exceptional flame retardance. Effective with wide variety of resins, both thermoplastic and thermosetting.



CELLUFLEX 23:

Alkyl epoxystearate. Economical low-temperature plasticizer and stabilizer for polyvinyl chloride and other polymers. Very low volatility.

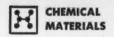


A thought to keep in mind—Celanese' shipment policies permit quick action to meet tight schedules. We ship from convenient points throughout the United States. We'll be glad to provide you with specifications on any of these plasticizers. For more information, write to: Celanese Chemical Company, a Division of Celanese Corporation of America, Dept. 591-D, 180 Madison Avenue, New York 16, N. Y.

Celanese® Lindol® Celluflex® Celluphos®

Canadian Affiliate: Canadian Chemical Company, Limited, Montreal, Toronto, Vancouver Export Sales: Amcel Co., Inc., and Pan Amcel Co., Inc., 180 Madison Avenue, New York 16, N. Y.

Check 1052 opposite last page.



Although succinic acid and anhydride have long been interesting, reactive compounds, economic factors have held back widespread utilization in most areas. Recent price developments mean that . . .

LOWER COST BOOSTS SUCCINIC APPLICATIONS

f series of saturated dibasic acids—oxalic, malonic, succinic-succinic acid is first which is stable to heat and does not decompose. Another distinguishing feature is the marked reactivity of both methylene groups, which results from symmetrically attached carbonyls. This structure makes possible the Stobbe Condensation. With few exceptions, this reaction is peculiar to succinic esters and substituted succinic esters. In this condensation succinic diesters react with aldehydes and ketones in presence of metal alkoxides or sodium hydride to give half esters of alkylidene succinic acids (itaconic acids).

A wide variety of carbonyl compounds can be used. For example, an aromatic aldehyde yields a bis-substituted acid.

H₂C-COOR H₂C-COOR H₂C-COOR H₂C-COOR Ar = ervi group

By far most important potential application of succinic anhydride is in plastics, resins and coatings. W. H. Carothers^{1,2} investigated succinic polyesters in the late 1920's, and compared these with adipates, sebacates and phthalates. Importance of succinic anhydrides in these applications stems from relatively small, highly polar molecule which

1. W. H. Carothers, JACS, 51, 2560-70 (1929) H. Carothers, JACS, 52, 711-21 (1930)

MICHAEL S. RHODES
Product Manager — Resin Chemicals
National Aniline Division
Allied Chemical Corporation

provides possibilities for a great degree of crystallinity and association through Van der Waals' forces.

Polymers of high impact and tensile strengths, excellent light resistance and good flexibility are possible. Alkyd resins based on succinic anhydride are suitable for blending in urea or melamine formaldehyde systems. This can set new levels of achievement in field of baking enamels for appliance and automotive industries.

Unsaturated, styrene crosslinked polyester resins, where succinic anhydride partially or completely replaces phthalic anhydride, will provide laminating resins of excellent color retention and high-impact strength. Polyester-type plasticizers should provide heat and light stable, compatible materials which would con-tribute improved adhesion to resulting films. Such products have been demonstrated to be excellent resinous plasticizers in nitrocellulose lacquers (U.S. Pat. 1,886,242).

Among specific applications of succinic anhydride in plastics field is case of unsaturated esters, such as vinyl succinate and diallyl succinate, for the preparation of casting, molding and laminating resins. Condensates of succinic anhydride and polyhydric alcohols

SUCCINIC PRICE BREAK

While prices in most industries are increasing, the chemical industry may be unique in its consistant trend toward lower prices. This was once again proven when the National Aniline Division of Allied Chemical Corporation slashed the price of succinic anhydride 31% from \$0.74/lb to \$0.51/lb in truck load quantities (see CHEMICAL PROCESSING, March 1960, page 41).

By this move, it is planned to increase the volume sales of succinic anhydride from the level of a specialty organic compound to a product enjoying large-volume use by many varied industries. In most applications, succinic anhydride will not compete with existing products, but rather open the markets for new products. As volume of application for the material increases, it is expected that the price will further decline, gradually, from \$0.51/lb to low 40's and eventually to the level of \$0.30-\$0.40/lb.

With this eventual low price in the offing, many facets of the chemical industry should be encouraged to undertake research and development programs which bring forth new products and new applications.

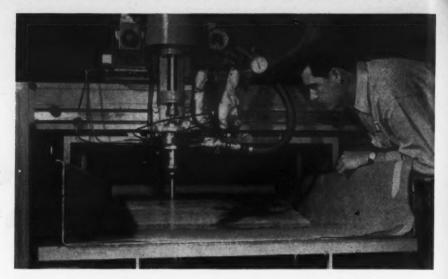
are useful in production of safety glass. Ethyl cellulose and polyvinyl alcohol can be esterified with this anhydride to give high-molecular-weight plastic materials.

Also, in curing of epoxy resins, anhydrides are constantly finding greater acceptance and usage. Since melting point of succinic anhydride is 118°C, compound can be used successfully for this purpose.

Until now, succinate diesters have been employed as specialty plasticizers. With economic considerations now in their favor, succinate plas-

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	T/	ABLE I		
Succinator	Mol. Wt.	Vise, ep (at 20°C)	Eff.	No. of Bends (at O°C)
Di(2-ethylbutyl)	268.4	7.8	36.7	27
DI(2-ethylhexyl)	342.5	12.0	43.5	23
Phthalates				
DI(2-ethylbutyl)	334.4	56.0	33.0	100 A 1 7 10
Di(2-othylhoxyl)	390.5	78.0	27.5	0



Experimental laboratory run of polyether "one-shot" urethane foam system developed in 1958 by Mobay

One-shot urethane foams of polyethers – new use for versatile organo-tins

GERRY P. MACK, Product Manager, Organic Chemicals
Metal & Thermit Corporation



Gerry P. Mack heads up technical service, for Metal & Thermit Corp.'s organic chemicals. Previously he was director of research for M&T Laboratories. Engaged in organometallic research for 20 years, he is the inventor or co-inventor in 35 patents in the field of polymer chemistry. Author of numerous technical articles in this field, Mr. Mack has spent considerable time in Europe investigating new chemical developments. He was appointed to his present post as product manager for organic chemicals sales in February, 1959

D ISCOVERY of high catalytic activity (isocyanate-active hydrogen) of certain organo-tin compounds has been the most recent development accelerating tonnage growth of urethane foam production.

This discovery led to "one-shot" foaming process for polyethers which up to that time had to be polymerized in a two-step process because of extremely slow reactivity with amine catalysts. This two-step process entailed costly pre-mixing and foam curing steps. Although a polyester "one-shot" process had been in wide use for some time, development of a similar system for polyethers entailed a whole new set of conditions.

The "one-shot" organo-tin catalyzed foaming of polyether-based urethanes immediately stimulated intense new interest in these foams at both supplier and user levels. The foams so produced gave improved economies and a wider choice of controllable foam densities.

As one producer after an-

other was attracted to installing the organo-tin "one-shot" production technique it became evident early in 1959 that "one-shot" polyethers were to become the industry's basis for a front-line effort to take over a sizeable portion of the cushioning market. At the same time, these "oneshot" polyethers began competing with the quite different "one-shot" polyesters, for markets where either could meet requirements. Here at last in the "one-shot" polyethers was the economic and performance combination for which the industry had been searching since 1955.

Since that year, urethane foam has soared from experimental quantities to 75 million lbs in 1959 — of which 70 was flexible and 5 rigid and semirigid. The industry expects to reach the 100 million mark this year, 90 and 10, respectively. By 1963, production forecasts indicate doubling of the 1959 level.

During the past year nearly all major manufacturers in the furniture and automotive

industries transferred varying portions of their cushioning needs from other materials to polyether-based urethane foams - a trend expected to gain momentum. Extensive marketing tests of urethane foams are now being conducted by at least five major mattress and bedding-products manufacturers. These products - which may provide the next big step for urethanes - promise an outlet equal to that of the already huge furniture cushioning market.

Original two-step process

Polyurethane foams were first discovered in the early '30's by German scientists exploring frontiers of high polymer chemistry. Farben Fabriken-Bayer achieved commercial production of isocyanates for urethane foams in the late 1940's. In the U. S. this was begun in 1956 by Mobay, Allied and Du Pont.

Based on the reacting of a high-molecular-weight glycol or triol with a disocyanate,

TABLE I. — Relative activities of some typical catalysts used at 1.0 mole %:

Catalyst	Relative activity
None	1.0
N-Methylmorpholine	4
Triethylamine	8
N.N.N', N'-Tetramethyl-1,3-butanediamine	27
Triethylaminediamine	120
Stannous chloride	2200
Ferric acetylacetonate	3100
Tetraphenyltin	9
Tri-n-butyltin acetonate	31,000
Bis(2-ethylhexyl)tin oxide	35,000
Di-n-butyltin diacetate	56,000
Di-n-butyltin dilaurate	56,000
Di-n-butyltin dichloride	57,000
Di-n-butyltin dilaurylmercaptide	71,000
Dimethyltin dichloride	78,000

TABLE II. — Synergistic effect; phenyl isocyanatebutanol reaction

Catalyst	mole	%	Relative activity
None Triethylamine alone Di-n-butyltin diacetate alone Triethylamine 1.0 mole % plus D-n-b-d 0.001%		*****	0.4 2.6 20.0 90.0

the original two-step process consisted of (1) producing a prepolymer and (2) foaming and curing.

The reactions for the prepolymer step are:

urethane prepolymer bearing isocyanate end-groups

Triols or triisocyanates may be included as cross-linking agents in preparing rigid foams.

In the second and final step, prepolymer is mixed with additional diisocyanate and water, in the presence of a suitable catalyst (generally a tertiary amine) and a silicone foam stabilizer. The reaction is

During this reaction CO2 is

generated which blows the reaction mass into a foam. Within minutes the whole mass becomes solid, and gas evolution ceases as reactants become exhausted.

Search for improvement

By early 1958, attempts to further reduce costs of urethane foams based on polyesters led to a search for a catalyst other than the amines. It was reasoned that if the polymerization could be speeded up, a "one-shot" process might enable casting the foam directly in the finished-product mold.

Two companies, suppliers of reactants, entered into accelerated research programs. Among the compounds studied were tertiary amines, inorganic bases, organometallics, and metal chelates. Mobay Chemical Co. announced the finding that certain organo-tin compounds possessed a fantastically higher catalytic activity for the particular reactions involved, and furthermore appeared to balance each reaction in proper se-

quence. Shortly thereafter a similar announcement was made by Union Carbide Chemicals Co.

As a primary producer of organo-tins, Metal & Thermit Corp. soon entered into a joint research program with Mobay, supplying more than 50 organo-tins and other tin compounds for evaluation. It was soon discovered that organo-tins having at least one carbon-to-tin bond were best for the isocyanate-active hydrogen reactions of the ure-thane foams.

Study of the kinetics of an ideal reaction of an isocyanate with an alcohol using a variety of catalysts gives the relative activity of such compounds, as shown in Table I.

From Table I it can be seen that the triethylamine catalyst typically used in the two-stage process, is at least 100 times less effective than the better tin catalysts. Catalytic activity is directly related to the structure of the organotin compound and can be summarized by:

 $\begin{array}{lll} R_2SnX_2 > R_2Sn0 > R_2SnX > R_3SnX > RSn00H > R_4Sn \\ \hline \mbox{Where R} & = & \mbox{Methyl}, \mbox{ Butyl or Phenyl} \\ \end{array}$

Synergistic effect discovery

In addition to the tremendous increase in reaction rate afforded by the organo-tins, it was further discovered that the use of tertiary amines with organo-tins gave a synergistic 2- to 5-fold further increase in catalytic rate. This is demonstrated in Table II. Besides those organo-tins shown in this table, similar synergistic activity has been demonstrated with a wide variety of organo-tin-tertiary amine combinations.

Polyether formulations

The commercial development of a "one-shot" process opened up the prospect of substituting lower cost polyethers (based on propylene oxide) for the then currently used polyesters. Polyethers, with their relatively low viscosities (deleterious to foam stability) and extremely slow polymerization with a mine catalysts, could now be comercially used, with the organo-tin-tertiary amine combination catalysts.

A typical formulation advocated during mid-'59 by one of the suppliers of reactants

Constituent Polyether	Pts by Wt
Toluene diisocyanate	38
Silicone oil	0.5
Triethylene diamine*	.075
n-Ethyl morpholine*	0.2
Dibutyltin di-2-	
ethylhexoate	0.2
Water	2.9
*both are tertiary amines; both	needed

1959 — year of trouble

During 1959 the polyether urethane foam industry ran into technical difficulties that have been corrected, as a result of intense effort by major producers of raw materials.

The pattern of events of that year makes an account of the battle for technological success that at times has major impact on an important chemical material. The remainder of this article will relate the problems encountered, and the solutions achieved.

Heat degradation problem

Shortly after the introduction of the "one-shot" polyether process, some aging tests similar to those used with foam rubber were proposed and undertaken. When first tested at a dry heat (158°F) for 7 days and steam autoclaving (220°F) for three hours, both "one-step" and prepolymer foams passed without difficulty. When, however, these foams were exposed in air to still higher dry heat temperature (285°F) it was discovered that severe

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Check 1053 opposite last page.

CHEMICAL MATERIALS

degradation of the foam took place, in some cases to a powder! Although there was no evidence to indicate that similar degradation would occur under ambient conditions, it nevertheless posed a psychological problem at the marketing level. Research programs were initiated by the major compound suppliers to seek out and eliminate the cause. It was soon found that the degradation did not take place in a nitrogen atmosphere, so oxidation was the cause. Further, it was found that the extremely active organo-tins, when used at higher concentration levels, could catalyze an oxidation reaction of the foam subjected to high temperatures. This oxidation was specific to polyethers and did not occur when polyesters were used. This was the cause of difficulties when the substitution with lower cost polyethers (which are more prone to oxidation) was undertaken.

It was found that the deggradation could be curbed somewhat by simply reducing the amount of organo-tin and increasing the amine. Further studies by Mobay using M&T catalysts showed that stannous types were completely safe and gave the desired excellent aging characteristics to properly compounded foams exposed to high temperatures.

In the meanwhile, the problem with organo-tins has been resolved in the industry by the aforementioned use of small quantities of such catalyst plus the addition of antioxidants, such as polyphenols, i.e. catechol, etc.

Modern formulation

Coming out of such studies and field testing is Mobay's and M&T's currently recommended formulation:

Constituent Polyether	Pts by Wi
Mondur® TS 80 (1)	38
M&T catalyst T-9	0.5
Triethylene diamine	
(Dabco) (2)	0.5
N-ethylmorpholine	0.5
Silicone X-520 (3)	1.0
Water	2.9
(1) Mobay Chemical Co.	

(2) Houdry Process Corp

(3) Union Carbide Chemicals Co

To page 34

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Weather forecasters in the future may be telling you, in addition to what climactic conditions to expect, how well you will be able to work during the ensuing 24 hrs and what your chances are of having an accident. A study at Blaw-Knox Company's East Chicago Works has shown that when the barometer falls, so does a person's work output. Conversely, proneness to accidents rises. High humidity also impairs a person's ability to

Sea-going 'Seal'

produce.

Four-year Navy search for an electric motor which would run 500 hr submerged in 4% salt solution has been ended by development epoxy-sealed motor which performs satisfactorily after 1000 hr submerged.

For more information on product at right, specify 1054 see information request blank opposite last page.





Becco Granted Patent On In-Situ Epoxidation Using Ion-Exchange Resins as Catalyst

Becco Chemical Division, Food Machinery and Chemical Corporation, has been granted U.S. Patent No. 2,919,283, covering in-situ epoxidation using ion-exchange resins as the catalyst. The process is an extremely practical and valuable one. As evidence, consider that millions of pounds of epoxy plasticizer have already been produced, using this method, by prominent companies in the industry.

Issuance of this patent is additional evidence of Becco's leadership in the field of epoxidation. (A license to use this process is offered to you by Becco; write for details.)

If you have an interest in this area, perhaps Becco's experienced Sales Engineers and research chemists can help you. Write us, outlining your problem. Complete confidence, of course. Address: Department CP-4





Food Machinery and Chemical Corporation

Station B, Buffalo 7, New York



Organo-tins

From page 32

In general, suppliers are: Polyethers, Atlas Powder, Dow, Wyandotte, Union Carbide; isocyanates, DuPont, Mobay, National Aniline; silicones, Dow Corning, Union Carbide; tertiary amines, Houdry, Union Carbide.

Although stannous catalysts solve the problem of foams at high temperatures, it was soon found that these catalysts tended to be unstable on storage and subject to oxidation when exposed to air. This was particularly the case of stannous catalysts made by conventional metal soap manufacturing processes. Problems on uniformity of catalytic activity necessitated M&T's undertaking research for an improved process. This work culminated with the announcement of such improved process, which now produces the stannous-type catalyst "T-9." Thus the industry now has a more uniform high stannous activity catalyst - so highly desired for economic production of foam.

Organo-tins — the future

With "one-shot" polyether urethane foams now commercially produced in rapidly increasing quantities, much development is being directed at mixing nozzle-proportioning techniques, and other problems associated with actual foam manufacture.

M&T's interests in this will be intensified with the early opening of a new customer service laboratory in Rahway. N.J. At this facility new materials will be evaluated, as well as other additives. An example would be fire-retardant additives mixed in during foam production. Such retardance is essential to urethane (or other) foams being acceptable for use in building construction. For thermal insulation and sound-deadening applications, urethane foams may well fulfill the needs of this huge potential market.

At present, two stannoustype catalysts (stannous octoate and catalyst T-9) are in

The basic design of Chempump, the first canned pump, has been tested and refined under tough field conditions for nearly ten years.

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commercial production. A new experimental catalyst T-18 now under active field testing appears to have the unique ability of improving compression-set in "one-shot" polyurethane systems. Development quantities are currently available.

(M&T Organo-tins and stannous catalysts are products of Metal & Thermit Corp., 100 Park Ave., New York 17, New York.)

Check 1056 opposite last page.

Succinic Applications

From page 29

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ticizers will find wider application. A comparison of succinate with phthalate plasticizers in plasticized nitrocellulose films is given in table I. Lower viscosities of succinates can be used to advantage preparing solutions of a high percentage of solids. Excellent flexibility at low temperatures suggests a means of achieving low-temperature demands on films imposed by commercial and military applications. These factors, coupled with excellent light stability, presage new, efficient tools for the research and application chemist.

Additional Reactions

Marked reactivity of methylene hydrogens is also shown in reactions of succinic anhydride and its acid with halogens. With two moles of bromine, succinic anhydride yields dl-2,3 di-bromo-succinic anhydride. It has also been reported that diethyl succinate, with an excess of chlorine in sunlight, results in a completely chlorinated ester.

Hec-cooc_eH₆

***scas Cis** Cis**

Such a compound could have an important future as a fire retardant.

In addition, succinic anhydride and its acid enter into

BRIEFS

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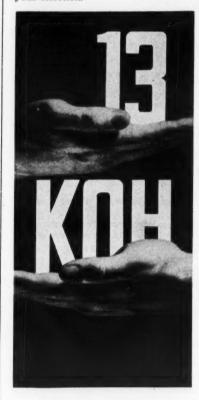
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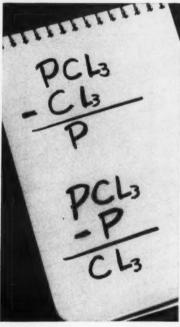
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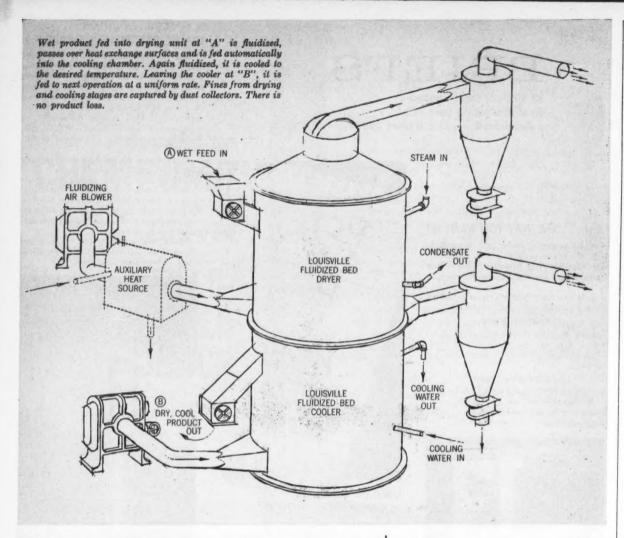
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Check 1057 opposite last page.



Major break-through in drying and cooling techniques announced by **GENERAL AMERICAN**

A new system for drying and cooling has been perfected by General American Transportation Corporation through their development of Louisville Fluidized Bed*equipment. Two Louisville units, one functioning as a dryer and one as a cooler are coupled vertically to provide a continuous automatic operation.

The system is particularly useful for crystalline chemicals, resins, polyvinyl acetate beads, polyethylene pellets, sugar and similar products having the proper particle size distribution. Louisville Fluidized Bed equipment offers these advantages:

- 1. Accurate, instantaneous temperature control
- 2. High heat transfer that permits compact design
- 3. Low maintenance costs (no moving parts)
- 4. Less cleaning time and labor
- 5. Less floor space (equipment is vertical)
- 6. No hot spots (product is fully protected)

Because of their simplicity, Louisville Fluidized Bed dryers and coolers adapt readily to complete automation.

For full details about this revolutionary development in drying techniques, write Dept. H

Process Equipment Division

GENERAL AMERICAN TRANSPORTATION COR

CORPORATION
135 South LaSalle Street
Chicago 3, Illinois
Offices in principal cities



*Patents Pending

Check 1058 opposite last page.

CHEMICAL MATERIALS

Succinic Applications

From preceding page

conventional reactions of carboxyl group. Mono or diesters can be prepared readily, depending upon experimental conditions. An interesting procedure employs an unsaturated hydrocarbon to obtain secondary esters.

Still another reaction typical of carboxyl and anhydride groupings is with amino compounds. Succinic acid for instance, reacts with ammonia and amines at elevated temperatures to produce succinimide and various N-substituted succinimides.

Another route to succinimide is the reaction between succinic anhydride and ures, with evolution of carbon dioxide and ammonia.

Succinimide, among its many applications, is an important intermediate in preparation of the amino acid β -alamine. N-bromo succinimide, readily prepared from this compound is a valuable brominating agent employed for introduction of a bromine atom into the allyl position of alkenes.

Food Use

Succinic acid, approved for use in foods by Food and Drug Administration under the 1958 Food Additives Amendment, finds many applications in foods and pharmaceuticals. In foods, succinic acid functions as an acidifier and taste modifier. Its role in the pharmaceutical industry is multiple and varied. For example, succinic acid and its anhydride are employed in synthesis of Vitamin A, Vitamin B, certain hormones and several sulfa drugs.

CHEMICAL MATERIALS

Other derivatives function as antidotes for barbiturate poisoning; intestinal antiseptics: muscular relaxants; and anticonvulsants.

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Another important application of succinic anhydride and its derivatives is in field of pesticides. In sect repellants (used against flies, mosquitoes, roaches, ants, ticks, termites, and beetles) are based upon this compound, while ammonium succinate arrests growth of blue-green mold decay of citrus fruits.

Succinic anhydride also plays an important role in manufacture of dves and organic pigments. Certain anthraquinone dyes are modified with succinic derivatives. Organic pigments of excellent heat and light stability are also based on succinic anhy-

(Succinic anhydride is a product of National Aniline Division, Allied Chemical Corporation, 40 Rector Street, New York 6, N.Y.)

Check 1059 opposite last page.

High silica content marks silica sol 50% concentrate

Uses: Material can provide anti-skid characteristics for paper bags and boxes and increase fiber-to-fiber friction in textiles. It can also be used as a vehicle to promote uniform formation of air bubbles in latex foam manufacture and as a plumping and softening agent in production of leather products. It can also be used in floor waxes to supply slip resistance.

Features: High concentration of silica, 50% by weight, offers savings in storage and handling as well as in

freight costs.

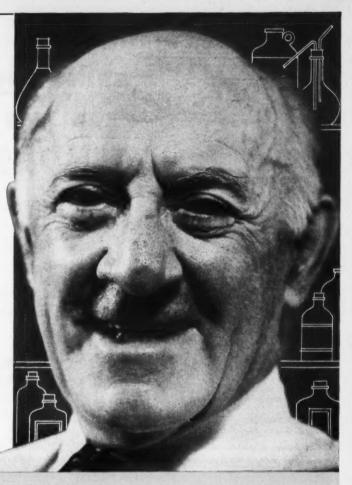
Description: Concentrate. an aqueous colloidal suspension of silica, is called Nalcoag 1050. It is available in 55-gal, non-returnable lined drums.

(Nalcoag 1050 is product of Nalco Chemical Company, 6216 West 66th Place, Chicago 38, Ill.)

Check 1060 opposite last page.

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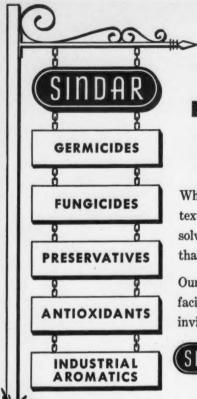
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Check 1062 opposite last page.



CHEMICAL

Versatile liquid epoxy cuts curing times...

- Up to 83 % with amine curing agents
- Hardness values increased over 30%

Resorcinol Diglycidyl Ether

Uses: A versatile liquid epoxy resin for use in casting, potting, encapsulating and tooling formulations; and in adhesives, reinforced laminates and surface coatings.

Features: Low viscosity and high reactivity of resin have permitted reductions in curing times up to 83% (see Table II) without loss of other properties, and more thorough penetration and wetting. Two epoxy groups in a small aromatic molecule offer one of highest epoxy concentrations available in an aromatic diepoxide.

Resin, Kopoxite 159, is compatible with a broad range of solvents (see Table I) and resins including epoxy, phenolic, resorcinol, urea, alkyd and butyral. Curing agents that can be used are a mines.

amides, organic acids and anhydrides, and aliphatic and aromatic polyols.

High surface hardness of cured systems suggests advantages in coating formulations and castings.

Description: Material is primarily resorcinol diglycidyl ether. It is a straw-colored liquid with a viscosity at 25°C of 500 centipoise.

Because of greater reactivity in most curing systems (see Table II) resins may be expected to cure more rapidly or at lower temperature than other epoxies. In systems containing substantial amounts of primary and secondary aliphatic amines, such as diethylenetriamine, curing rate is likely to be so rapid, even at room temperature, that special mixing and handling techniques are required.

Resin exhibits a high degree of versatility in adhesives. They can be formulated to give high strengths when bonding a wide range of sub-

Physical and Chemical Properties

Mol wt	222.2
Color	Straw yellow
Sp gr @ 25°C	1.21
Lb/gal @ 25°C	10.1
Boiling pt. °C @ 0.8 mm	172
Viscosity, centipoise @ 25°C	500
Refractive index n _D ³⁶	1.541
Flash pt, °F min (COC)	350
Oxirane oxygen, wt%	12.5
Epoxy value (Equiv of ox-ox/100 g)	0.78
Total chlorides, wt%	0.5
Free epichlorohydrin, wt%	0.1
lonic chlorides	nil
Moisture, wt%	0.3

Solvent Solubility

Solubility determinations using equal volumes of Kopoxite 159 and solvent at 25°C

Miscible with:

hanvene*

chloroform

toluene

carbon tetrachloride*

methyl alcohol

ethyl acetate

methyl ethyl ketone

n-butyl acetate

ethyl and butyl Cellosolve**

*Slightly cloudy

**Trademark of Union Carbide Corporation

Partially miscible with:

water heptane

ind

lyl

ethyl alcohol

xylene

n-butyl alcohol

diethyl ether

diethylcyclohexane

- TABLE II -

Reactivity with Typical Curing Agents

Curing agent Epi-Cure-83°:

		bath temp		hardne	ss (Barcol)
_	phr	°C	gel	time	after gel
159	23	120	30	min	75
Resin Ab	15	120	3	hr	57
Curing agent 60%	m-phe	enylenediamine	40%	methyle	nedianiline:
159	28	50	60	min	85
Resin A	18	65	- 1	2/5 hr	75

Curing agent Nadic' methyl anhydride plus 0.5% amine catalyst:

159 138 120 18 min Resin A 90 120 28 min 25

a) Modified amine curing agent—Jones-Dabney Co.
b) Liquid epoxy resin, diglycidyl ether of Bisphenol-A. Epoxide equiva-lent 190-210.
1 Trademark of Allied Chemical Corp.

strates, at curing temperatures from 25 to 175°C. Because of wide compatibility with other resins and modifiers, adhesive properties can be adjusted to meet special requirements.

Toxicity

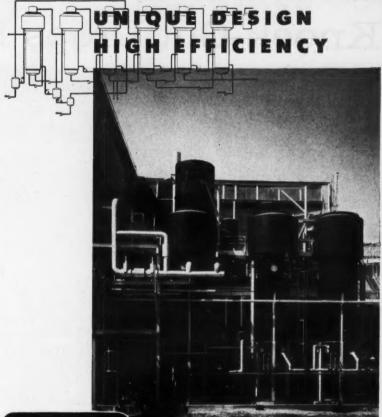
Hazards to be encountered in handling Kopoxite 159 are similar to those encountered with other liquid epoxy materials. It has slight acute oral toxicity in animals, with an LD₅₀ for rats of 2 to 3 g/kg. It has moderate acute toxicity by intraperitoneal injection with an LD50 varying from 0.13 to 0.24 g/kg. Some percutaneous absorption occurs, although this mode of entry does not appear to offer serious hazard.

Resin is relatively nontoxic by inhalation, is moderately irritating to skin and severely irritating to eyes. Solutions may cause more irritation and injury than undiluted material, particularly if solvent is compatible with water.

Handling and Storage

Resorcinol diglycidyl ether is similar to other liquid epoxy materials in handling characteristics. Adequate protective equipment including gloves and eye protection should be worn as dictated by particular circumstances. Interstate Commerce Commission has classified this material for labeling and shipping purpose as a Class "B" poison (solid). Shipment by U.S. Mail

To next page





BLACK LIQUOR EVAPORATOR at NEW SOUTHERN PAPER MILL

This six body, sextuple effect evaporator system was installed in a U-shaped arrangement and was designed to concentrate 428,000 lbs. of black liquor from 14 per cent to 50 per cent solids content, when supplied with 56,000 lbs. per hour of 45 psi steam. The high efficiency of this system (5.52 lbs. of water per pound of steam) was made possible through a new and novel feed arrangement into the evaporators.

The first effect evaporator is equipped with 2 inch diameter stainless steel tubes while the other five have welded seam carbon steel tubes.

For more detailed information write for bulletin #PI 509-1



MANUFACTURING CO., INC. P.O. BOX 631 . BIRMINGHAM, ALABAMA

FILTERS / EVAPORATORS / PROCESS EQUIPMENT CONTRACT MANUFACTURING including HEAVY CASTINGS

Check 1064 opposite last page.

Knock-Out Drops For Foam!



Control Foam in Any Type of System with Low Cost Silicone Defoamers

Does foam occur in your process operations? Chances are you can keep it under control at all times with a Dow Corning silicone defoamer. Job-proved in virtually every industry . . . petrochemical, textile, paper, paint, food and many others . . . Dow Corning silicone defoamers knock down the most violent and persistent foam. Eliminate processing slow-downs and boil-overs. Reduce fire hazards. Cut waste and clean-up costs.



AVAILABLE IN HANDY SPRAY CAN

And Dow Corning silicone defoamers are amazingly effective in minute quantities. For example, just 1 ounce of a Dow Corning silicone defoamer prevents foam in 31,250 pounds of dog shampoo, in 59,110 pounds of wire drawing solution, and in 62,500 pounds of paper coating solution. . . are similarly effective in defoaming adhesives, latices, caustic liquor, soap, varnish, emulsion paints and coatings, cutting oils, petrochemicals, food products . . many, many others.

Dow Corning's continuing research study of foam and its control has brought about the availability of silicone defoamers as compounds and emulsions for different



IN PAPER SIZING

types of production systems — and in handy spray cans for split-second defoaming of smaller batch processes. Settle your foam problems once and for all time with a Dow Corning silicone defoamer. A generous trial sample is yours for the asking. Indicate your problem and system — oil, aqueous, nonaqueous, food product, or any other. Write Dept. 3204 for a rapid reply.

Your nearest Dow Corning office is the number one source for information and technical service on silicones.



Dow Corning CORPORATION

MIDLAND. MICHIGAN

ATLANTA BOSTON CHICAGO CLEVELAND DALLAS LOS ANGELES NEW YORK WASHINGTON, D. C.

Check 1065 opposite last page.

is not permitted.

Sample quantities of or pint, one quart, and one gallo may be shipped via rail express, rail or motor freigh Maximum amount which may be shipped by rail express in 200 lb. Larger quantities can be shipped by rail or motor freight.

Product may crystallize of long standing, particularly a temperatures below 77°F. It is readily restored to normally fluid and homogeneous condition by warming to approximately 140°F with stirring Samples stored in glass containers at room temperature showed a slight increase in viscosity after thirtee months. There was no change in epoxide content, refractive index or specific gravity and no apparent change in color.

No special precautions are necessary in storing this material. It is compatible with usual materials of construction and containers used to ship organic chemicals. There are no special fire hazards.

(Kopoxite 159 is a product of Chemicals and Dyestuffs Div, Development Dept., Koppen Co., Inc., Pittsburgh 19, Pa.)

Check 1066 opposite last page.

Bonding of latex paints to chalky surfaces aided by additive

Bodied dehydrated castor oil replaces portion of resin

Uses: Improving adhesion of latex paints to chalky surfaces.

Features: Latex paint formulated by replacing one-third of latex resin with this additive passed a Scotch Brand masking-tape test. Unmodified paint did not. Test consisted of pressing a one-inch-wide strip of tape tightly across applied coating and then removing it. Modified coating a dhered to chalky substrate.

Description: Additive is bodied dehydrated castor oil (Castung 403-Z3). Latex formulations prepared with this additive show same characteristics as unmodified coatings. Sward hardness after a

our-hour drying period at 0°F, and 50% relative hundidity, was four. It resisted xposure to 10% NaOH. Alali resistance of modified oating was superior.

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Castung 403-Z3 is product f The Baker Castor Oil Company, 40 Avenue A, Bavonne, N. J.)

Check 1067 opposite last page.

Germicide-fungicide irring exhibits high activity

Uses: Product is recommended for formulation of fungicidal preparations such as dandruff-control rinses, shampoos, and agricultural fungicides.

Features: Product exhibits high activity against many representative fungi and microorganism pityrosporum ovale, one of the causative microorganisms in dandruff formation. Fungistatic levels are easily demonstrated below 10 ppm.

Description: Germicidefungicide, Isothan Q-75, is available as a 75% concentrate of n-alkyl (50% C12, 30% C14, 17% C16, 3% C18) isoquinolinium bromides. It is an amber hydrophilic liquid with a pleasant characteristic odor. Extremely surface active, it greatly reduces surface and interfacial tensions of water in recommended use dilutions. It is soluble in wide variety of polar solvents and cationic.

(Isothan Q-75 is the product of Onyx Oil & Chemical Company, Jersey City, New Jersey.)

Check 1068 opposite last page.

COMING UP

Have you read the article on page 30 describing the use of organo-tins as urethane foam catalysts? A further exploration into the field of organometallics will be presented very soon in this section when the spotlight falls on organo-aluminums, their uses and potentials.



UNIQUE CORN STARCH DERIVATIVE

It's industry's first cationic starch. Name: CATO.® It carries a cationic charge as an integral part of its polymeric structure. A strong affinity for negative surfaces results. As demonstrated by migration to the cathode of an electrophoresis cell.

CATO has other unusual starch properties, including greater clarity and increased stability. New applications appear month after month. As a size . stabilizer · binder · thickening agent · flocculant · retention aid · reenforcing agent.

CATO is now in production use in paper, textile and other industries. It may well answer some special need in your product or process. We'd be pleased to tell you more about CATO. Write, telling us something of the use you have in mind.

> STARCH and CHEMICAL CORPORATION 750 Third Avenue, New York 17

3641 So. Washtenaw Avenue, Chicago 32 735 Battery Street, San Francisco 11

Check 1069 opposite last page.

ADJUSTABLE

ORIFICE

PLATE

a **NEW** scrubber for ultra-efficient dust and fume control

THE DUCON TYPE VO Oriclone SCRUBBER

- 50% less space requirements than other high energy scrubbers.
- Higher operating efficiency at lower horsepower.
- Adjustable orifice maintains peak efficiency when operating conditions vary.
- Economical in first cost and operating cost.
- Simplicity of design permits economical alloy construction or acid brick lining.
- 99% efficiency below 2 micron and in sub-micron range.

The Ducon Type VO Oriclone Scrubber—the only high energy scrubber with an adjustable orifice—is the most effective and most economical dust and fume collector for a wide range of industrial applications, including recovery of catalyst dust, cupola dust and fumes, acid mists, tar fog and many others.

The Oriclone Scrubber is a completely integrated unit that performs the entire separation cycle. No subsequent collector is needed.

Send today for detailed information on Oriclone.

the name in Dust Control

Patent Pending

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GAS-LIQUID

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CYCLONES . CENTRIFUGAL WASH COLLECTORS . TUBULAR CLOTH FILTERS . DUST VALVES

Check 1070 opposite last page.

CHEMICAL MATERIALS

High-temperature strength offered by glass-epoxy laminated plastic

Retains 68% flexural strength After one hour at 300°F

Uses: Laminate's ability to retain strength at elevated temperatures makes it particularly suitable for use as base for copper-clad laminated plastics. It can be used wherever high ambient temperatures are encountered.

Features: Maximum heat resistance for continuous use is 350°F. A one-eighth-inch thick sheet of this glass-epoxy laminate retains at least 65% of its flexural strength after one hour at 300°F.

Description: Material is a glass-base, epoxy-resin laminated plastic designated as grade GEC-111. It is furnished in sheets only, in a thickness range of 0.01 to 1 inch inclusive.

Water absorption after a twenty-four hour immersion, is 0.2% max. Because of this low moisture absorption, laminate exhibits a low dielectric loss and good insulation resistance even during exposure to high humidity. Flexural strength, lengthwise, is 60,000 psi minimum.

(GEC-111 glass-epoxy laminate is a product of Taylor Fibre Company, Norristown, Pennsylvania.)

Check 1071 opposite last page.

Low-molecular-weight polyethylene resin trio offered

A trio of low-molecularweight polyethylene resins has been added to manufacturer's line.

Epolene LVE is an emulsifiable material with a molecular weight of approximately 1500. Viscosity is 170 cp at 160°C. It is useful as a softening agent, a textile size, a paraffin modifier to improve coating adhesion and heat stability, and as an emulsion paper coating.

Epolene HDE has a density of 0.956 and is emulsifiable. It

CHEMICAL MATERIALS

may be handled as a wax due to its low melting point and has a viscosity of 160 cp at 160°C. It is compatible with oleic acid, an important floor polish ingredient, and deposits an extremely hard

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Epolene HD is non-emulsifiable and can be ground with ink vehicles into a fine, stable dispersion. Viscosity is 150 cp at 160°C.

(Epolene LVE, HDE and HD are products of Eastman Chemical Products, Inc., subsidiary of Eastman Kodak Company, 260 Madison Avenue, New York 16, N. Y.)

Check 1072 opposite last page.

Pure rare earth metals in powder form

High-purity mischmetal, cerium, lanthanum, didymium and other rare earth metals and alloys are now available in form of finely divided powders. Powders are available in any desired size down to -325 mesh. Purities range from 99.5 to 99.9%.

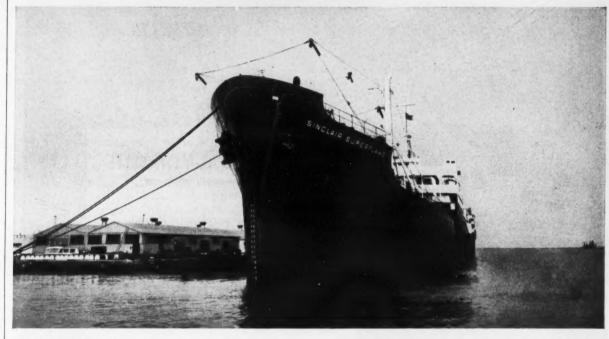
(Rare earth metal powders are available from Cerium Metals & Alloys Div., Ronson Metals Corp., Newark, New Jersey.)

Check 1073 opposite last page.



"I've come up with an adhesive that sticks to anything and everything. but I can't get it out of the container."

HOW HERCULES HELPS...



MOOR A TANKER-When the S.S. Sinclair Superflame was lashed by a hurricane while mooring, every line snapped during the storm's fury except one-an American Manufacturing Company's "Floterope," made from Hercules Pro-fax® polypropylene. Today, over a year later, that same polypropylene line is still in

use aboard the Superflame-proof that Pro-fax rope can meet the marine industry's most demanding challenge. Whether it be for rope or automobile seat covers, household appliances or industrial uses, wherever a tough, rigid, versatile synthetic is needed, Pro-fax is setting new standards for accomplishment.





LAUNDER A SHIRT-Nothing makes a man feel betterdressed than a well-laundered shirt. That's why so many commercial laundries depend on Huron Starch to provide a truly professional job. In the field, Hercules-trained representatives back up the performance of the product by assisting laundries in finding solutions for technical problems.

IMPROVE INDUSTRIAL BLASTING

"The Man with The Red Valise," a familiar sight to those who use industrial explosives, is typical of Hercules service. In this kit is the complete line of Hercules blasting caps in dummy form. Using this display, the Hercules representative can familiarize the customer with the complete range of Hercules blasting devices that are available to fit various requirements.

HERCULES POWDER COMPANY

900 Market Street, Wilmington 99, Delaware

CHEMICAL MATERIALS FOR INDUSTRY

HER.CULES

Check 1074 opposite last page.



Chemical Materials

Chemical-milling control material developed to assist in accurate and economical control of this metal-working process is featured in step-by-step procedure bul. A bibliography to current literature on photo milling is included. Pamphlet P-36 — Graphic Reproduction Sales Div., Eastman Kodak Company.

Check 1076 opposite last page.

Rocket propellant combinations' performance data is presented in chart form measuring 29" x 14½" printed in three colors. Maximum specific impulse and other data are given for 12 possible combinations. "Rocket propellant Combinations"—Becco Chemical Div., Food Machinery and Chemical Corp.

Check 1077 opposite last page.

Molecular sieves' uses are discussed in 12-page brochure. Emphasis is on uses in latent curing and such factors as release temperatures versus volatility. Methods of handling are described together with a list of type of chemicals that can be pre-loaded in molecular sieves. "Chemical-Loaded Molecular Sieves in Rubber and Plastics" — Linde Company, Div. of Union Carbide Corrections.

Check 1078 opposite last page.

Alkanolamides and glycol esters' properties and uses are subject of technical bulletin. Functions of alkanolamides as foam boosters, foam stabilizers, thickeners, detergents and emulsifiers are described. "Alkanolamides and glycol Esters" — Clintwood Chemical Company.

Check 1079 opposite last page.

Molybdenum, its applications, physical properties and production processes are listed in the informative 12-page brochure which includes information on forms available commercially and new avenues of potential application. Brochure on Molybdenum — Sylvania Electric Products, Inc., Subsidiary of General Telephone &

Check 1080 opposite last page.

Surface active agents' applications in manufacture of pulp and paper are outlined in booklet of 22 pages. Besides describing pulp and paper uses, bulletin briefly outlines chemistry of alkylphenol adducts. Bul AP-97 — General Dyestuff Company, Sales Division of General Aniline & Film Corporation.

Check 1081 opposite last page.



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Wash-proof Leather

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Soft leather garments that don't shrink or lose their tanning from perspiration or washing are being made from leather tanned with glutaraldehyde. Discovered over 50 years ago, chemical only recently became available commercially. Agricultural Research Service chemists pinpointed its value as tanning agent when they noticed close similarity to formaldehyde. an old tanning material, and decided to test it.

Plastic line moors ship

Polypropylene lines which are light, which float if dropped overboard, and which are 5% stronger wet than dry are being used as mooring lines on tanker Esso Zurich. This use marks first marine application of product.

For more information on product at right, specify 1082 see information request blank opposite last page. The wide range of physical properties now available in Eastman's Epolene series of low-molecular-weight polyethylene resins provides formulating flexibility never before possible. For with the addition of three new resins (Epolene LVE, HDE and HD), you can choose now from among seven different types to improve your existing formulations or to develop new products.

In designing the three new resins, Eastman called upon its experience in those fields where low-molecular-weight polyethylene is now used, or has been seriously considered, to determine the limitations of existing materials. As a result, there are now one or more resins which have been tailored for use in waxes, inks, rubber, coatings, polishes, textiles and plastics molding and extrusion compounds.

New and expanded production facilities at Longview, Texas, assure immediate availability of all Epolene resins.

Epolene E emulsifiable • Originally developed for wateremulsion polishes, this resin produces floor polishes of excellent hardness, durability, gloss, shelf life, and resistance to scuff and dirt pickup. Recently its use in emulsions has been extended to a variety of coatings, textile finishes, lubricants and leather dressings.

Epolene LVE emulsifiable • Lower in melt viscosity than Epolene E, this new resin is easier to handle. Being somewhat softer, too, it imparts improved anti-slip properties and increased rebuffability to floor polishes. Epolene LVE is an effective calender release agent or lubricant in rubber and plastics processing, and an efficient softening agent in "wash and wear" finishes. As a paraffin modifier, it improves adhesion and heat sealability.

Epolene HDE emulsifiable • The first high-density, emulsifiable polyethylene available. Considerably harder than either the E or LVE types and more compatible with oleic acid, Epolene HDE produces polishes of remarkable hardness. Melt viscosities similar to Epolene LVE assure easy handling.

Epolene N non-emulsifiable • When blended with paraffin and other waxes and resins, Epolene N improves tensile strength, electrical properties and abrasion resistance, and increases melting and blocking temperatures. Employed principally to enhance the properties of paraffin coatings for paper and dairy cartons, it is also useful as a wax modifier in candles, crayons, solvent paste polishes, and electronic potting compounds.

Epolene C non-emulsifiable • Higher in molecular weight (7000) than other resins in the series, Epolene C was developed especially for coating paper and packaging materials. Epolene C has a melt viscosity sufficiently low to permit its application directly as a hot melt to paper and foil. Wax blends modified with it exhibit higher melting points and improved toughness and gloss.

Epolene LV non-emulsifiable • Lower in melt viscosity and molecular weight than Epolene N, this resin is somewhat easier to handle. Its uses include most of those listed for Epolene N. Epolene LV may be blended with plastic-grade polyethylene to obtain shorter injection molding cycles.

Epolene HD non-emulsifiable • Similar to LV in handling ease because of its low melt viscosity. Owing to its exceptional hardness, Epolene HD can be ground with ink vehicles to produce stable fine dispersions for printing ink applications. Its high softening point may be used with other waxes to increase their softening point. It has a higher density than has any of the other non-emulsifiable types.

Eastman now offers the widest range of

lowmolecular-weight

polyethylene resins

7 Basic types Molecular weights from 1500-7000 Densities from 0.907-0.956 Emulsifiable and non-emulsifiable

Epolene® EASTMAN low-molecular-weight polyethylene resins

If you are now using low-molecular-weight polyethylene resins in your product or have only considered their use, investigate the complete Epolene series. Your Eastman representative will be glad to help you select the right resin or combination of resins.

SALES OFFICES: Eastman Chemical Products, Inc., Kingsport, Tennessee; Atlanta; Chicago; Cincinnati; Cleveland; Detroit; Framingham, Mass.; Greensboro, N. C.; Houston; New York City; Philadelphia; St. Louis. West Ceast: Wilson Meyer Co., San Francisco; Los Angeles; Portland; Solt Lake City; Seattle.



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DAWE'S LABORATORIES, INC. 4800 South Richmond Street

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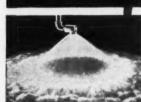




lead, hard rubber, hardened steel, tungsten carbide and many others.



uniform distribution with spray angle, capacity, impact and atomization to your specifications.



to improve every spraying operation

Improve performance, lower spraying costs with Spraying Systems spray nozzles. Prompt delivery. For complete information write for Catalog 24.

SPRAYING SYSTEMS CO. 3216 RANDOLPH ST. • BELLWOOD, ILL. ADVANCED SPRAY NOZZLE DESIGN FOR NEW DIMENSIONS IN CONTROL AND PERFORMANCE

Check 1084 opposite last page.

CHEMICAL MATERIALS

Pelleted pulp bulletin presents data on variety of test runs involving kraft, unbleached groundwood, kraft, unbleached sulfite, bleached semi-chemical and bleached kraft. "Better Fibers," Vol. 1, No. 5 — Sprout, Waldron & Co., Inc.

Check 1085 opposite last page.

Chemical listing of industrial and specialty items features data on physical properties as well as shipping information. It is classified into seven sections: Acids and Anhydrides; Alcohols; Plasticizers; Aldehydes; Aromatic Intermediates; Solvents; and Miscellaneous Chemicals. Bul P-102 — Eastman Chemical Products, Inc.

Check 1086 opposite last page.

Molybdenum metal technical bulletin is designed to provide convenient, condensed data and selected references on binary and more complex diagrams pertaining to molybdenum. "Molybdenum Constitution Diagrams" — Climax Molybdenum Company, Div. of American Metal Climax, Inc.

Check 1087 opposite last page.

For more information on developments reported in this section, check corresponding numbers on Reader Service Slip opposite last page of this issue.

Carbon-14 labeled compounds are illustrated in 46-page catalog which gives prices, ordering and licensing information, purity methods and other pertinent data. Cat Sec 6 — Research Specialties Co. Check 1088 opposite last page.

Process starches, gums and adhesives are concisely described in eight-page illustrated booklet. Origin of raw materials and a list of industries where products are used are included. "Products and Serv-Morningstar-Paisley Inc.

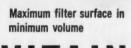
Check 1089 opposite last page.

Polypropylene's properties and applications are described in four-page brochure which discusses and chemical resistance, strength-to-weight ratio, electrical properties. "Polypropylene" — Catalin Corporation of America.

Check 1090 opposite last page.

Surface-active agents are subject of revised pamphlet. Series of dioctyl, di-hexyl and di-isobutyl sulfosuccinates, in liquid and powder form, are treated. Pamphlet 212b — Mona Industries, Inc.

Check 1091 opposite last page.



ALL STAINLESS STEEL

- Cleanable easy to service
- Corrosion-resistant
- Low pressure drop
- High-temp service
- · No break through

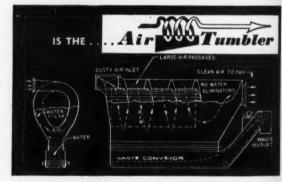


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30 Sea Cliff Ave., Glen Cove, N.Y.

Check 1092 opposite last page.

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More than one million CFM in ONE plant

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CHEMICAL PROCESSING

CHEMICAL MATERIALS

Ion-Exchange Resins are subject of 12-page catalog price list. Details include custom services available, resin selection and application and a bibliography. Price list N-Bio-Rad Laboratories.

Check 1094 opposite last page.

Surface-active agents are detailed in eight-page bulletin which presents physical properties and enduse data. "Geigy Surfactants" — Geigy Industrial Chemical Div., Geigy Chemical Corporation.

Check 1095 opposite last page.

Plastics shapes, including blocks, sheets, rods, film and tubing, are described in 70-page catalog. Plastics described include acrylic, Kel-F, Mylar, nylon, Teflon and others. Plastics Cat — Kaufman Glass Company, Plastics Div.

Check 1096 opposite last page.

Natural cryolite is subject of 24page illustrated booklet which deals with history, physical and chemical properties and uses of this material. Thermal, chemical and high-temperature reactions are discussed. Bul S-159 — Pennsalt Chemicals Corp.

Check 1097 opposite last page.

Industrial plastics booklet underlines properties, applications and availability of nylon, Teflon, Penton and polycarbonates. Information on fluidized bed coating process is also included in 16-page booklet "Industrial Plastics" — The Polymer Corporation.

Check 1098 opposite last page.

Aliphatic surface-active agents' effectiveness as anti-stalling agents in gasoline and their usefulness as corrosion inhibitors, anti-fouling agents and detergents are subjects considered in Special Report No. 3 — Armour Industrial Chemical Company.

Check 1099 opposite last page.

Color in printing where tinted papers and color-related inks replace black-on-white systems is demonstrated in 20-page experimental pamphlet "The Age of Reason for Color" — Allied Chemical Corporation, National Aniline Division.

Check 1100 opposite last page.

Nine thermoplastic materials' physical, electrical, chemical and optical properties are presented in chart form. Acrylics, acetate butyrate, Teflon and Kel-F fluorocarbons, nylon, polyethylene and vinyls are covered. "Plastics Table of Properties" — Cadillac Plastic & Chemical Company.

Check 1101 opposite last page.



SEND COUPON BELOW FOR THESE P.F.I. STANDARDS

- 1 Machining Backing Rings for Butt Welds
- 2 Dimensioning Welded Assemblies
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- 9 Arc-Welding Dissimilar Ferritic Steels
- 10 Stress Relieving Practices
- 11 Affixing Permanent Symbols to Piping



While we're afraid the P.F.I. Standards wouldn't be much use to the moon travelers above, they are valuable to you "earth-grounded" readers.

Listed at the left are the technical bulletins that are proving their usefulness to many engineers.

These P.F.I. Standards are packed with vital data on the design, the fabrication and erection of high pressure and high temperature piping used by all industry. However, these technical bulletins do not explain the many advantages of shop fabrication.

Remember, shop fabrication by the companies responsible for the development of P.F.I. Standards is your only real assurance of meeting the most exacting requirements of piping, whether it's welded, bent, coiled or vanstoned . . . in any metal as a component or a complete assembly. Write for all eleven P.F.I. Standards or indicate in the coupon below which ones could be helpful to you.

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Check 1102 opposite last page.

Freeport Sulphur mining operation showing one production arm at left with its tower. Another production arm will branch off at right

offshore sulfur operation lighted by 711 vaportight fixtures

Were selected for vibration-proof socket and weather protection furnished by outside globe

GORDON WEYERMULLER, Associate Editor



Continuous operation of Freeport Sulphur Company's Grand Isle mine in the Gulf of Mexico is aided by 711 v-51 vaportight lighting fixtures installed along railing of platforms, up and down the drilling derricks and on the power plant outside walkways.

Primary reason for selection of the vaportight lights was for the vibration-proof socket and the protection from weather furnished by outside globe. Vapor-resistant feature retards corrosion of contents and insures longer fixture

socket life.

About 340 of the fixtures were placed in service in October and November of 1958—about 120 in February 1959—and the remainder in January 1960. All have proven satisfactory, despite the need to withstand the corrosive, hot, salt air.

Features of Fixtures

One advantage of the V-51 fixture is that it can be quickly relamped or converted to a different wattage. All that is

required is a few quick twists of the wrist.

Cushion against vibration is provided by neoprene rubber ring between reflector and malleable iron Unilet. Globe adapter has shock-absorbing socket and vaportight gasket.

Most of the lights at the Freeport installation have only a guard over globe although some do employ a reflector. Guard is made of diecast aluminum with two stainless steel sealed ball plunger units that snap securely into cavities in globe

adapter. Steel reflector has green porcelain enamel exterior and white interior.

Sulfur Operation

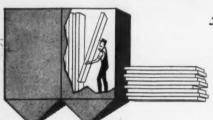
Since Frasch sulfur mining operation continues 24 hr a day, seven days a week, the lighting must be good to maintain high efficiency at night. Employees work five consecutive 12-hr shifts while living at the mine, after which they can be at home for five days. Helicopters transport

To next page



SLY DUST FILTERS

ACCESSIBILITY





SLY DUST ARRESTER

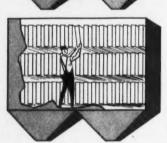
Every cloth screen from the end of





1930's SLY TUBE-TYPE FILTER

To replace a tube required at least partial disassembly of every other tube in the way.





Any filter bag is easily accessible and can be replaced without need for removing others.

NEW SLY DYNACLONE PROVIDES FASTEST, EASIEST BAG CHANGING

Whether you change one bag, or the entire filter, you do it in less time with the Dynaclone. Quick replacement of individual bags eliminates the need for costly rebagging should only a few be worn. Complete change is also fastest . . . the Dynaclone has only one half as many bags as other filters with the same cloth area. In addition . . .

New "Resist-O-Wear" bags offer 200 to 300% more bag life.

The Dynaclone operates continuously. It provides complete dust suppression through constant suction.

The Dynaclone is automatically self-cleaning by reverse air. A single exhaust fan provides both suction for dust collection and air for bag cleaning. No auxiliary blowers required.

And the Dynaclone provides 20 to 40% more cloth in a given space than other makes of dust filters.

The Dynaclone has been proved in more than 1,000 installations. Investigate its advantages on your applications . . .

SEND FOR 36-PAGE CATALOG 104

THE W. W. SLY MANUFACTURING CO.

4754 Train Avenue • Cleveland 1, Ohio • Offices in Principal Cities • Overseas Licensee:

Andrew Air Conditioning Ltd., London 8, W. 1, England

Check 1103 opposite last page.

NEW SOLUTIONS

Offshore Sulfur

From preceding page



Fixture utilizing both guard and reflector

the employees over seven miles of water to and from a landing base at Grand Isle, Louisiana.

(V-51 vaportight lighting fixtures are product of Appleton Electric Company, 1701 Wellington Ave., Chicago 13, Ill.) Check 1104 opposite last page.

For story on unusual seven-mile, underwater pipeline — which consists of three concentric pipes and utilizes an alloy never before made into tube — which is used

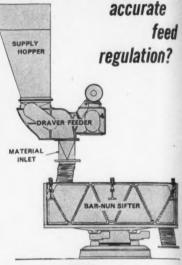
to move sulfur from Freeport's offshore operation to shore, see page 172.

Four-story towers dry and condition cellophane at American Viscose

Valuable floor space is being conserved through use of four-story-high drying towers at American Viscose, Marcus Hook, Pa. Used to dry and condition cellophane coatings, the towers play a key role in the recently completed plant which can produce 50 million pounds cellophane per year.

After coating, the cellophane web is fed into the drying side of the tower. Unit has two zones, with respective heating and circulation equipment being located on second and third floors. Solvent remaining from coating operation is drawn off in lower portion of dryer and sent to re-

Can you increase output of present process machines by





DRAVER FEEDERS

available with automatic controls

Alternate flooding and starving of process equipment—like sifters, grinders and dryers—often causes machine choke-ups with resulting downtime, wasteful reprocessing, or a substandard finished product makes it impossible to get maximum efficiency, continuously.

Hundreds of process plants use GUMP Draver Feeders to prevent this loss. Dravers control the flow of material at the correct rate to maintain continuous production at optimum capacity. A quick capacity adjustment meets any change in the product or other conditions. Timing controls are available for feeding preset amounts at automatic intervals. And the cost is negligible compared with the production savings.

Ask GUMP engineers how Draver Feeders can help maintain higher production in your plant. No obligation.

Write for Catalog 804.

For details on Gump Equipment, refer to your copy of Chemical Engineering Catalog.



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B. F. GUMP Co.

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Check 1105 opposite last page.

CHEMICAL PROCESSING

CHEMICAL N

Consumption of Heavy Chemicals Grows with U.S. Living Standard

According to statistics assembled recently by the MCA, every man, woman and child in this country in 1958 used over 46 pounds of caustic soda, 182 pounds of sulfuric acid, 41 pounds of chlorine and 44 pounds of ammonia. Per capita consumption of these basic heavy chemicals has been growing steadily since 1939, when the comparable figures were 16,

73.7, 7.9 and 7.3 pounds respectively.

MCA says that this growing consumption is a broad indication of the increasingly important part chemicals are playing in the nation's material well-being. Of course, these chemicals are not seen by the public in the form in which they are produced. But they are used in the manufacture of thousands of everyday items such as soaps and detergents, wearing apparel, paper, gasoline, and plastic

Polyethylene Production In 1959 Estimated at Over a Billion Pounds

In 1959, for the first time in the history of the plastics industry, the one billion pound production mark was passed, and by two materials—polyethylene and vinyl. The Society of the Plastics Industry estimates that production of polyethylene was 1.2 billion pounds, of vinyl 1.1 billion pounds. Estimated production of either of these two raw materials in 1959 exceeded the total production of all basic plastic raw materials as recently as 1946, when only 994,277,000 pounds of plastic raw materials were produced.

As a manufacturer of polyethylene, U.S.I. As a manufacturer of polyethylene, U.S.I. has been predicting for some time that this material would be the country's first billion-pound plastic. By the end of 1959, the company's own polyethylene production capacity had reached 175 million pounds, with 125 million pounds of additional capacity scheduled to come onstream in 1960. When expansions are complete, U.S.I. will have an overall production capacity of 300 million pounds annually, and will be the second largest among all polyethylene producers.

New Acetone Data Sheet Just Released By U.S.I.

Specifications, properties, shipping information and uses for acetone are listed in a new data sheet now available from U.S.I. The material is employed widely as a solvent for cellulose acetate, vinyl resins, fats and waxes, acetylene gas and a host of other industrial products. Acetone is also used in the manufacture of drugs, dyes and plastics, in many other organic syntheses, and as a de-

waxing agent for lubricating oils.

The new data sheet can be obtained from U.S.I. sales offices or from the New York office at 99 Park Avenue.

Unique U.S.I. Pilot Plant Supplies Vinegar Makers with **Technical Data and Assistance**

Ethyl Alcohol Supplier U.S.I. Has Been Operating Vinegar Test Generators Since 1932; Helps Customers with Problems, Studies Production Variables, Keeps Industry Informed.

One of the large uses for industrial ethyl alcohol is in the production of vinegar - an operation which consumes ten million gallons of ethyl alcohol

DL-Methionine Used to Treat Chronic Peptic Ulcer

In a 41/2-year study reported recently, 54 patients with chronic peptic ulcer were treated orally with the essential sulfur amino acid, DL-methionine (3-6 grams/day) and good clinical results were obtained in 80% of the

The patients treated were divided into two groups: those who received methionine preoperatively only, to see if their ulcers could be healed prior to surgery; and those who were given medical treatment with methionine to prevent or diminish the number of recur-rences. Seventeen of 18 cases in the surgical group healed prior to surgery. Twenty-six of 36 cases in the medical group responded favorably. Of these, 23 with duodenal ulcers had long-term good results. The clinical findings suggest that chronic

ulcer patients undergo a kind of stress so as to lose sulfur-containing substances such as mucin. This metabolic loss can decrease resistance of the duodenal mucosa to autodigestion and lead to ulceration.

annually. For years, U.S.I. has provided a complete technical service for this industry at a unique pilot plant devoted entirely to the study of vinegar manufacture from ethyl

U.S.I. does not make vinegar now, but did make it as dilute acetic acid for chemical raw materials prior to World War II. Consequently, the company has a first hand knowledge of just what kind of help its customers need to turn out the best products most efficiently and economically. U.S.I. supplies this help in three forms: basic studies of the variables in vinegar manufacture; work on customer problems; and regularly published technical news letters to the industry.

Research on Vinegar Production

Over the years a group of specialists, with a highly trained staff, has operated U.S.I.'s battery of vinegar test generators in pursuit of knowledge on such considerations as: vine-gar aroma and the constituents of the raw material which contribute to it; calculations of the conversion efficiency of generators; oxy-

MORE

gen requirements; packings; heat production and control; nutrients; acid concentrations;





Dr. J. H. Mueller, of U.S.I.'s Cincinnati Research Dr. Mueller draws off vinegar sample from test Laboratory, is shown putting an ethyl alcohol generator in U.S.I.'s vinegar pilot plant at the (SDA-35A) charge into a vinegar generator. Cincinnati Research Laboratory.

U.S.I. CHEMICAL NEWS

CONTINUED

Vinegar Pilot Plant

mineral content of waters effects of equipment; effect of alcohol denaturants; bacteriology of the process,

Vinegar News Letters

Since 1953, this research work has been reported to the vinegar industry through a series of news letters which have been issued on the average of four times a year. These news letters are comprehensive reports on matters of vital interest to the field. Not only do they concern themselves with data developed at the U.S.I. pilot plant, but they also present reviews of published data, patents and foreign developments. In 1958, one of these news letters gave a comprehensive report on happenings at the International Vinegar

Customer Service on Vinegar

U.S.I. customers come to this fully equipped, fully staffed vinegar pilot plant with their production problems. When a manufacturer's yield has dropped off, and he wants to determine the causes and correction, a U.S.I. technician from the research lab will call, when requested, and make a full examination of the problem. After studying similar conditions in the pilot generators U.S.I. can then recommend certain solutions to the problem.

This unique pilot operation was originally headquarters at Baltimore, Maryland, but was moved about a year ago to join other U.S.I. test facilities at the Central Research Labora-tories at Cincinnati, Ohio. More complete information on its activities may be obtained from U.S.I., 99 Park Avenue, New York 16, N. Y., on request.

Recent Study Determines Rate at Which Undesirable Biuret Forms from Urea

The rate of biuret formation from urea under various conditions was determined in a recent study undertaken to help fertilizer formulators control the presence of this harmful chemical. Biuret, one of the main by-products obtained on heating urea, has a detrimental

action on plants and leaves. It is therefore desirable to be able to estimate the rate of its formation from urea under manufacturing and shipping conditions.

The study, made by U. S. I.'s Roderick Shen and published in Agricultural & Food Chemistry, permitted determination of the constants of biuret formation from urea at different temperatures. By use of such constants, the rate of biuret formation from urea solutions at different concentrations can be calculated for any temperature. Results have been put in the form of tables and graphs. Further informa-tion may be obtained from U. S. I.

Sodium Reduction Route to Thorium Reported to Give Very High Purity Product

The U.S. Bureau of Mines has developed a new route to thorium which yields the metal at 99.8% purity, with an oxygen content of 200-500 ppm. The process utilizes sodium reduction of the chloride, which was one of the first techniques tried over a century ago when thorium was discovered. At that time, however, it was discarded because it produced a powder with over 3% oxygen content.

New technology on the effective applica-tion of alkali metals as reducing agents has brought the process back into use. The modern sodium reduction process not only yields a purer product than the 100-year-old version, but also gives a sponge rather than a powder. This cuts down on handling problems and fire

By the new method, thorium nitrate is con verted to the oxalate with oxalic acid. The oxalate is then reacted with carbon tetrachloride to yield thorium tetrachloride, which is purified by distillation in nickel equipment.

Reaction of the chloride with metallic sodium is carried out in a titanium crucible under an inert atmosphere, by heating to 350-400°C, at the start and then raising the tem-perature to 850°C. When reaction is com-pleted, the crucible is evacuated. Excess sodium and sodium chloride are distilled off at C. under high vacuum, and the high-purity thorium sponge is recovered for vacuum arc melting to ingots.

TECHNICAL DEVELOPMENTS

Information about manufacturers of these items may be obtained by writing U.S.I.

3.000 Assayed biochemicals for research are described in new reference guide. Sections covermino acids, peptides, alkaloids, reagents, carbohydrates, enzymes, hormones, purines, pyrimidnes, proteins, vitamins, other products.

n-Butyl myristate (BUMYR) is subject of recent technical bulletin. Material is said to resemble low-viscosity natural oils but without their ob-jectionable characteristics. Suggested for drugs, cometics. toiletries.

Carbon-14 labeled compounds listed in new, 46-page catalog, Includes licensing information, purity methods, other pertinent data. Offers many license-exempt packages. Has special list of hydrocarbons.

New atmospheric-particle counter now on market said to be designed for continuous monitoring of outdoor or indoor atmosphere. Includes strip-chart recorder, alarm system. Counting rate is 1,000 particles per minute. No. 1573

Molybdenum metal is discussed in new, illustrated brochure which includes general description, processing, properties, table of molybdenum products and their uses, wire conversion chart and resistance-temperature chart

No. 1574

Thioacetamide as analytical reagent is subject of new technical booklet. Material used to precipitate metal sulfides by "precipitation from homogeneous solution." Avoids handling of hydrogen sulfide. Reaction mechanism discussed.

Sodium-potassium alloys (NaK) and potassium covered in 8-page brochure now available. De-tails, chemistry, properties, and uses of NaK as heat exchanger fluid in atomic reactors or high temperature processes. No. 1576

Cationic chemicals as conditioners for hygroscopic salts and fertilizers are described in new booklet. Formulations, methods of application, recommended uses are included. Field test results with fertilizers also given.

Detackifier for rubber, said to be widely used in Europe, now being made here in commercial quantities. Used as dip or spray solution. Coats uncured rubber stocks within stable film which prevents adhesion.

No. 1578

Polyethylene bottle-cardboard carten pack now being used for reagent chemicals. Bottle cap is replaced by pour-spoul cap plus tubing and clamp. Carton is inverted and package becomes dispenser. When empty, pack is disposable.

PRODUCTS OF U.S.1

Alcohols: Ethyl (pure and all denatured formulas); Anhydrous and Regular Proprietary Denatured Alcohol Solvents SOLOX®, FILMEX®, ANSOL®M,

anic Solvents and Intermediates: Normal Butyl Alcohol, Amyl Alcohol, Fusel Oli, Ethyl Acetate, Normal Butyl Acetate, Distriyl Carbonate, DIATOL®, Diethyl Oxalate, Ethyl Ether, Acetane, Acetacetanliide, Acetacet-Ortho-Tolvidide, Ethyl Acetacetae, Ethyl Benzoylacetate, Ethyl Chioroformate, Ethylene, Ethyl Sodium Oxalacetate, Sodium Ethylate, Urethan U.S.P. [Ethyl Carbamate], Ribofavin U.S.P.

rmaceutical Products: DL-Methonine, N-Acetyl-DL-Methonine, Urethan USP, Intermediates.

Heavy Chemicels: Anhydrous Ammonia, Ammonium Nitrate, Nitric Acid, Nitrogen Fertilizer Solutions, Phosphatic Fertilizer Solution, Sulfuric Acid, Caustle Soda, Chlorine, Metallic Sodium, Sodium Peroxide.

PETROTHENE® ... Polyethylene Resins

Animal Food Products: DL-Methionine, MOREA® Premix (to authorized mixer-distributors).



DUSTRIAL CHEMICALS CO.

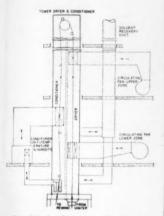
Division of National Distillers and Chemical Corporation 99 Park Avenue, New York 16, N. Y.

U.S.I. SALES OFFICES

Atlanta • Baltimore • Boston • Chicago • Cincinnati • Cleveland Detroit • Kansas City, Mo. • Los Angeles • Louisville • Minneapolis New Orleans . New York . Philadelphia . St. Louis . San Francisco claiming equipment located in adjacent building.

Following drying, the web passes over a water-cooled roll at top of tower and travels down through conditioning section where moisture evaporated during drying stage is returned to web. After leaving conditioner, web passes through water-cooled pull rolls to the rewind.

Major part of equipment is constructed of stainless steel. Temperature sensing elements are located in dryer and con-



Simplified drawing of drying and conditioning tower in cellophane plant

ditioner supply ducting. Units activate automatic controls to regulate temperature and humidity conditions.

Air from both dryer and conditioner sections is recirculated through respective supply equipment to minimize heat losses. High percentage of solvent-laden air is continuously withdrawn from dryer section and replaced with fresh air supplied to heating units. Air warmed by steam coils is used to heat the equipment.

(Further information about towers may be obtained from Waldron-Hartig, Division of Midland-Ross Corporation, P.O. Box 791, New Brunswick, New Jersey.)

Check 1106 opposite last page.

For more information on product at left, specify 1107 . . . see information request blank opposite last page.



OTHER VOGT PRODUCTS

Forged Steel Valves —
Petroleum Refinery and Chemical
Plant Equipment — Steam
Generators — Heat Exchangers —
Ice Making and
Refrigerating Equipment.



fittings and flanges have unmatched strength and toughness for your most severe pipeline duties. Laboratory controlled materials and Vogt's special forging techniques assure products which are always uniform in structure, fine grained, and free from porosity. Thereby the shocks and stresses imposed by high pressures and high temperatures are easily withstood, and with stubborn resistance to erosion and corrosion. Consult Catalog F-10 for our complete line of fittings and flanges.

For a copy of Vogt Catalog F-10 address Dept. 24A-FCP.

HENRY VOGT MACHINE CO., P.O. BOX 1918, LOUISVILLE 1, KENTUCKY SALES OFFICES: New York, Chicago, Cleveland, Dallas, Camden, N. J., St. Louis, Charleston, W. Va., Cincinnati

DROP FORGED STEEL

Fittings and Flanges

Check 1108 opposite last page.





STRAINER ELEMENTS — Design based on precise study of flow rate and pressure drop, selection of proper metallic fabric from our broad stock range, and research on proper sizing and supports.

HOUSINGS — Designed for dirt load, accessibility of strainer elements for cleaning, piping, corrosion resistance, etc.

Coordination of all these considerations is essential to superior strainer performance—and Multi-Metal assures it. Write for Catalog.



Check 1109 opposite last page.

NEW SOLUTIONS

Tramp iron nusiance stopped with magnet at cork plant

Problem: Tramp iron in cork bales caused production slow-down and machinery damage at Servicised Products Corporation, Chicago, Ill. Company manufactures various products from cork.

Cork bales are broken open and swept into hole in floor leading to breaker rolls which pulverize the material. Crushed cork then passes into vertical screw lift that conveys product to subsequent processing units.

Solution: A permanent, nonelectric, magnetic grate was set into the floor opening. Unit measures 28½ x 32". Similar magnets have proved



Nonelectric magnetic grate set in floor opening removes tramp iron from cork being fed to pulverizer

highly efficient in removing iron contamination in numerous industrial plants.

Results: Magnet has stopped costly damage and production stoppages caused by tramp iron. Magnetized tubes in the grate easily remove the iron as fast as the cork passes over them. Magnet can be cleaned in matter of minutes.

(Magnetic grates are product of Eriez Manufacturing Company, Erie 6, Pa.)

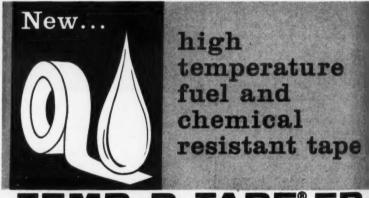
Check 1110 opposite last page.

Instrument case histories as applied to industrial waste treatment systems are included in 26-page bulletin. Bul B97-2 — Minneapolis-Honeywell Regulator Company, Industrial Division.

Check 1111 opposite last page.



Check 1112 opposite last page.



TEMP-R-TAPE FR

CHR's pressure-sensitive, TEFLON tape with fluoropolymer adhesive.

Temp-R-Tape FR, an exclusive development of CHR, has been specifically made for applications where fuel or chemical corrosion resistance is necessary at temperatures as high as 400°F. In addition to meeting these severe service requirements, Temp-R-Tape FR possesses outstanding electrical properties. It is recommended for splicing, harness wrapping and protective covering on engines of all types, hydraulic equipment, chemical pipelines, and all types of mechanical parts.

AVAILABLE FROM STOCK: 3/4" to 2" widths, 36 yd. rolls. Special roll widths slit to order. Sold nationally through distributors.

FREE SAMPLE and folder — write, phone or use inquiry service.

ELECTRICAL AND INDUSTRIAL SPECIALTY TAPES



CONNECTICUT HARD RUBBER C

*duPont TM

Main office: New Haven 9, Connecticut

Check 1113 opposite last page.

THAT'S

As certain

Within the span of this decade your day-today weather forecast may read something like this: "Light to moderate rain beginning at 9:35 a.m. and ending in showers by 4:48 p.m." And this forecast will be 99% accurate! At least that is the prediction of Capt. H. T. Orville, USN Ret., v-p of Beckman & Whitley.

Greaseless taxi ride

In a test of bearings lined with Teflon, six 1958 model taxis were driven 50,000 miles without chassis lubrication. This is equivalent of 4 to 5 years driving by average car owner. Other cabs in fleet had to be greased 36 times during same period, indicating savings of \$300 a cab in grease job cost during life of vehicle.

For more information on product at right, specify 1114 see information request blank opposite last page.



Maintaining a constant temperature of 70 to 72° F in a 1623% sulfuric acid solution is an ideal application for Platecoil...typical of many engineered by Tranter Manufacturing inc., Lansing, Michigan.

Corrosive environments dictate the use of stainless steel, Tranter's rigid production requirements dictate the use of J&L Consistent Quality stainless steel.

Why J&L? Here's the reason given by Mr. M. C. Nolen, Tranter Purchasing Agent:

"Tranter uses J&L stainless because of its uniform quality. It takes all the headaches out of raw materials and makes our job a matter of just processing this superior product."





Jones & Laughlin Steel Corporation . STAINLESS and STRIP DIVISION . DETROIT 34

Life of cooling towers prolonged by chemical treatment

Decay of wood prevented at large refinery

Problem: Fungal attack — known as rot — was deteriorating four cooling towers installed in the early 1940's in a large refinery. Both brown and white rot were present in tower, along with soft rot in flooded zone.

Greatest evidence of the rot was found beneath fans in dry portion where hot vapors contact tower. This fungal attack is frequently accelerated by products of corrosion associated with iron fittings in towers.

Solution: In March 1956 refinery started using a double-diffusion method of chemically treating the cooling towers in place, known as the Martreat method.

In first stage, copper and zinc sulfates and arsenic acid are applied to the cooling tower. In second stage, sodium chromate is applied, causing the precipitation of salts within the pores of the wood where they cannot easily be leached out.

In addition to chemical treatment of towers, some changes were made in water treatment. The pH was raised from 6 to 7, with sulfuric acid being used for pH control. Chlorine and zinc chromate inhibitor are used to treat the water. Phosphate treatment was discontinued.

Results: In June 1956, three months after first tower was treated, No. 7 cell showed following analysis for chemicals in wood:

In wood:

ZnSO₄·2H₂O

10.41 lb/cu ft

10.31 lb/cu ft

Na₂CrO₄·4H₂O

10.51 lb/cu ft

10.51 lb/cu ft

10.51 lb/cu ft

Later analyses on this cell and others indicate that total quantity of fungicidal chemicals in wood should be 1.00 or more five years after treatment.

For one 10-cell tower, cost of treatment was \$12,255. Since it cost about this same amount to replace the wood in just one fan cell and about \$200,-000 to replace an entire tower,



NEW!

...the combination of

the combination of these two equipment in designing or procuring components for

Write today for this brochure:
The New Story of
C. H. Wheeler Mfg. Co. / Griscom-Russell Co.
c/o C. H. Wheeler Mfg. Co.
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Philadelphia 32, Pa.



among the many components offered are: Condensers, Ejectors, Heat Exchangers - Bare Tube, Extended Surface Heat Exchangers,



C. H. Wheeler Mfg. Co. / Griscom-Russell Co.

lines offers important savings for management and engineering staffs engaged a variety of applications in power plants, marine, process and nuclear systems.

C. H. Wheeler Manufacturing Company, with 71 years' experience manufacturing condensers, ejectors, pumps and other components for the power, marine, process and nuclear industries, and Griscom-Russell, with 92 years' experience in the heat exchange field, are uniting to create an

important pool of experience, products and services unmatched in industry today. The advantages offered by this combination are improved and increased selection, distribution and service, resulting in substantial savings for the current and potential customers of both companies.

C. H. Wheeler Mfg. Co./Griscom-Russell Co.

PHILADELPHIA, PENNSYLVANIA

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SUBSIDIARIES OF HAMILTON-THOMAS, INC.

Evaporators, Marine Distilling Plants, Marine Systems, Pumps, Nuclear Components, Valve Actuators, Custom Fabrication and Machining

Check 1115 opposite last page.



the double-diffusion treatment method is considered to be economical insurance.

(Martreat cooling tower treatment is development of The Marley Company, Inc., 222 W. Gregory Blvd., Kansas City 13, Missouri.)

Check 1116 opposite last page.



Gold, silver removed from air and gases by dust collector

Efficient recovery of precious metals from air has paid for the cost of a dust collector within two years at Handy & Harman Company, El Monte, California. Operating virtually 100% efficient, unit has recently completed five years of trouble-free service. Original filter bags are still in use.

The company manufactures gold and silver alloy wire, sheet, and other special forms for jewelry and electronics fields. In melting and alloying precious metals, as well as cutting, sawing and forming it, certain amounts escape into air.

All gases and air are passed through the collector before leaving plant. Not only has the unit paid for itself but it has insured good community relations by preventing air pollution. Reversed jet action automatically cleans bags.

(Dualaire filters are product of Western Precipitation Corporation, P. O. Box 2744, Terminal Annex, Los Angeles 54, California.)

Check 1117 opposite last page.



MAGNETROL

The World's Most Dependable

LIQUID LEVEL CONTROL

Because of the utter simplicity of Magnetrol's magnetic operating principle, standard models can be easily adapted to meet any special requirements for pressure, temperature or corrosive liquids . . . and usually at little extra cost. This Magnetrol versatility has solved all kinds of tough level control problems . . and given our engineers wide application experience that can be invaluable to you.

Magnetrol is so simple that failure is all but impossible? Using only permanent, unfailing magnetic force for its operation, there's nothing to wear out . . no diaphragms or bellows to stiffen and rupture . . . no electrodes to short or corrode . . . no packing to bind or leak. Magnetrol is practically maintenance-free! Magnetrol units are available for controlling level changes from .0025-in. to 150-ft. . . with multi-stage switching when desired. Send coupon for full details.

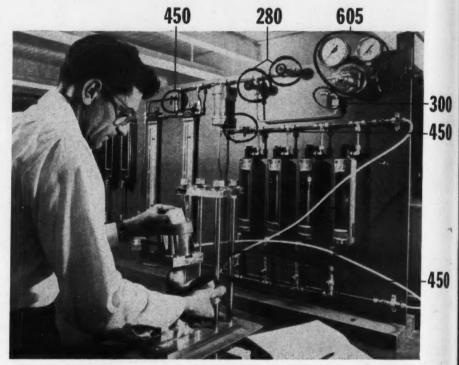
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Check 1118 opposite last page.

NEW SOLUTIONS of processing problems



Operator preparing to check sample of refractory on permeability apparatus. Designations indicate location and type of miniature valves and regulator used on unit

Miniature valves, regulator aid refractory testing

Provide close control of air flow used in permeability determination on refractories at new research center

GORDON WEYERMULLER, Associate Editor with B. A. COHRSSEN, Research Engineer, Harbison-Walker Refractories Company Garber Research Center, Pittsburgh, Pa.

N ew two-million dollar research center of Harbison-Walker Refractories Company provides excellent facilities for testing refractories, castables and similar materials used in high-temperature processing. One example of type of equipment available is the permeability testing apparatus which utilizes a number of miniature valves and a regulator to provide close control of flow.

The permeability test is used for measuring the air flow through brick and similar materials. Apparatus is operated at room temperatures at pressures between ¼ and 5 psi. It is important that the pressure and flow of air be closely regulated. For this purpose, a number of different types of miniature valves and a pressure regulator are employed. A description of these units corresponding to designations on photograph follows:

No. 300 Needle Valves

A 300 series miniature forged needle valve is used near pressure regulator at upper right as shown in photo. This 303

forged stainless, brass valve provides leak-type service at pressures to 3000 psi. Bluntpoint stem provides accurate flow control.

No. 280 Metering Valves

In center of photo at left of pressure regulator are shown two 280 series metering valves used to control small flows with fingertip accuracy. Twenty turns of valve handle move eight-degree needle from closed to open position. Valves are made of 316 forged stainless and brass. They have a 1/16" orifice for service ranging from vacuum to 3000 psi.

No. 450 Toggle Valves

At top, left and bottom of photo are six No. 450 springclosing toggle valves used in controlling air flow through tubes. These 303 forged stainless, brass units have synthetic rubber seat and stem seal and molded nylon handle. They are suitable for pressures to 200 psi and temperatures from -40 to 200° F. Quick, positive vacuum-tight seal and easily identified position are useful features

Pressure Regulator

Forged brass pressure regulator of No. 605 series is shown at upper right in photo. This regulator insures constant control of pressure. Unit has needle valve for auxiliary control. Regulator is designed for maximum safety, providing quick relief of excess pressure. Maximum delivery pressure is 40 psi, with flow rate of 200 cfh.

(Miniature valves and regulator are products of Hoke Incorporated, One Tenakill Park, Cresskill, N.J.)

Check 1119 opposite last page.

For more information on developments reported in this section, check corresponding numbers on Reader Service Slip opposite last page of this issue.

FLUIDICS*AT WORK Yield up, costs down



Different silhouette and light-blue exterior tell you the Pfaudler "RA" Series Glasteel Reactor is new. Unit shown has BH drive.





"Mirror image" provides like-size nozzles on each half of top head. Facilitates piping.



Offset bottom head outlet is in sweep path of agitator and in line

NEW from top to bottom... Pfaudler "RA" Series Reactors

The old "Pfaudlers" (R Series) that you're so familiar with are passing from the scene.

. In their place, we now offer the all-new "RA" Series Glasteel Reactors with many significant design improvements.

Two New Drives. Starting at the top, you'll find the TW drive on the 300 through 1000 gallon reactors for power requirements to 15 H.P. The BH drive takes over on the 1500 gallon and larger sizes for power requirements to 60 H.P.

Both drive designs are compact, easily installed and maintained. Very quiet, too -a difference that's appreciated when operating a full line of reactors.

Mirror-Image Top Head. Next note the equal number of nozzles on each half of the top head, placed symmetrically for ample freedom in piping. For example, you can feed two reactors from a single tee-one to the left, one to the right.

And, since there are no cumbersome drive supports, you have convenient access to manhole, observation window, nozzles, drives, baffles, dip pipe and mechanical seal.

Offset Drain. Off the bottom head you get fast drainage, since the outlet has been offset from center to a position in the direct sweep path of the agitator. Also, the outlet is in line with the top head manhole for convenient inspection.

Corrosion Resistance. Of course, inside there's Glasteel 59. Excellent resistance to all acids (except HF) to 350° F, and on to 450° F., depending on concentration. Mild alkalies at moderate temperatures are also permissible. Thermal shock resistance is up 30% over the "R" Series. At a vessel temperature of 250° F., your recommended safe temperature differential is now 260° F. Abrasion resistance has also been increased by 20%. Glasteel 59 is smooth-resists build-up of sticky products. As a result, you have high heattransfer rates, increased product yield, fewer shutdowns for cleaning, and much longer service life.

Stock Delivery. Standard "RA" Series Reactors range in size from 300 to 4000 gallons with the 500, 750, 1000 and 2000 gallon vessels stocked for two-week delivery from receipt of your order.

Write for specifications. New Bulletin No. 988 is now available. For your copy, write to our Pfaudler Division, Dept. CP-40, Rochester 3, New York.

for Johnson's Wax with Titan centrifuge

When you take the wax from the carnauba palm tree leaf, the wax becomes contaminated with residual leafy particles.
Since S. C. Johnson & Son, Inc.,

Racine, Wisconsin, uses large quantities of carnauba wax in their many products, the cost of raw materials and clarifying are significant.

Before turning to centrifuging, some refined carnauba was purchased, and considerable crude was

clarified using plate and frame filters.
Costs were high. Yields were low.
Then the Pfaudler Titan Superjector was installed. Yields of clarified crude increased from 90% to 97%. Consider that the value of refined carnauba is 80 cents a pound, and these savings take on real proportions. Also, the quality of the clarified wax is excellent, so that it's no longer necessary to purchase premium-priced "refined" grade.



Carnauba wax melts at 180° F. therefore, the Titan centrifuge at S. C. Johnson was specially equipped to maintain a bowl temperature of approximately 240° F.

Other Uses. The unique "Select-eject control" in a Pfaudler centri-fuge provides broad-range product handling. With continuous feed and solids-only discharge, you get maximum dewatering and concentration of slimy solids. With instantaneous discharge of full bowl contents, coarse, compacting-type granular solids are effectively handled.

See for Yourself. Schedule a test of your product in Pfaudler's Test Center or in your own plant under production-scale conditions with a Pfaudler field evaluation unit. For details, write for Bulletin No. 946.

FLUIDICS wherever you are: Pfaudler Permutit is a world-wide company with plants in Germany, Great Britain, Canada, Mexico, Japan and four in the United States.

*FLUIDICS is the Pfaudler Permutit program that integrates knowledge, equipment and ex-perience in solving problems involving fluids.

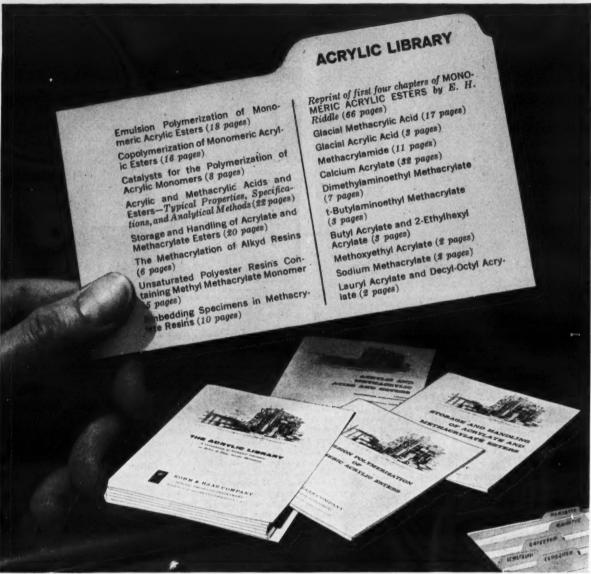


PFAUDLER PERMUTIT

Specialists in FLUIDICS...the science of fluid processes Check 1120 opposite last page.

Rohm & Haas offers this working library on

ACRYLIC MONOMERS



This acrylic library offered by Rohm & Haas is backed up by 29 years of production experience and an even longer period of research activity in the acrylic field. It is a collection of literature that should prove to be a valuable working tool to the technical man engaged either in commercial or development operations—especially since it is made up of bulletins that are continuously revised to keep up to date with new developments. Supplying this literature is part of a technical service program extended by Rohm & Haas to acrylic monomer users.

Get this library shown above, free of charge. Write, on your company letterhead, to Dept. SP-3.



Chemicals for Industry

ROHM & HAAS COMPANY

WASHINGTON SQUARE, PHILADELPHIA 5, PA.

NEW SOLUTIONS

Centrifugal clarifier helps turn out clear, instant coffee

Removes fine-sized grounds that cause haze

Instant coffee that retains maximum clarity when water is added is being produced with the help of a centrifugal clarifier at S. A. Schonbrum & Company Inc., manufacturers of Savarin Coffee. Unit is capable of processing 2600



Centrifuge has four chambers, clarifies 2600 gal coffee per hr

gph and removes fine-sized grounds that would be exceptionally difficult to eliminate by conventional screning methods. Unless removed, this material gives the coffee a hazy appearance.

At the plant, liquor is fed into top of centrifuge through feed tube. Product enters first of four chambers in bowl where centrifugal force removes largest particles. Diameter of each succeeding chamber is larger, increasing centrifugal force so that liquor is fully clarified by the time it leaves last chamber.

Paring device discharges foam-free clarified coffee concentrate at 50-60 psi Product then passes to receiving tank for spray drying.

Use of a spare bowl permits practically continuous operation at Savarin. Bowls can be switched in matter of minutes. Unit holds up to 17 gal of solids without affecting efficiency.

(Model K212 centrifugal clarifier used in operation is product of The De Laval Separator Company, Pough-keepsie, New York.)

Check 1122 opposite last page.

NEW SOLUTIONS

Liquid heat transfer units for heating jacketed processing equipment are described in four-page illustrated bulletin. Examples of units in pharmaceutical and asphalt production, in batch and continuated the continuation of the continuation o ous operations, and with Dow-therm systems are shown. Bul 102.2 — Hynes Electric Heating Company.

Check 1123 opposite last page.

Plastic sheets, 75-ft long cured efficiently in 2-deck oven

Unit has three separate heating zones

Efficient, automaticallymonitored curing of 75-ft long. 7-ft wide sheets of plastic is being accomplished through use of 80-ft, double-deck oven at Goodyear Tire & Rubber Company. Reported to be one of the first of its kind, the oven is designed to handle and hold for eight hours or longer, two sheets simultaneously at predetermined temperatures up to 300°F.

The plastic sections are fed into the oven at rate of 40 fpm. Oven's double-deck arrangement permits second section to be fed into upper deck



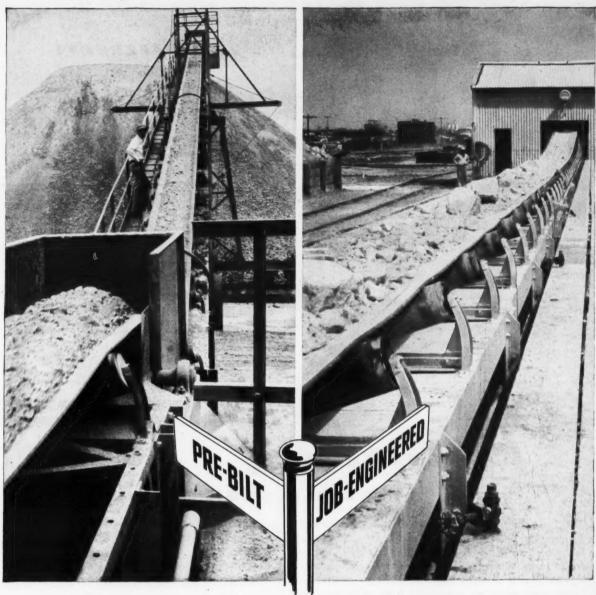
Double-deck oven is 80-ft long, cures two 75-ft sheets of plastic at temperatures up to 300°F

of oven. Sheets are moved through unit by means of individually-driven chain conveyors.

Oven is brought up to temperature automatically. Steam passing through fin-type coils is used for heat. Coils are located in insulated enclosures at top of oven. Distributing fans circulate air through oven.

During curing, air is recirculated in each of oven's three heating zones at rate of 5750 cfm — or total of 17,000 cfm. Fast cooling at end of cure

Choose your route to lower handling costs



Modernize for greater profit with a LINK-BELT belt conveyor system

Belt conveyors have proved themselves the giant of industry for low-cost, bulk materials handling. And additional benefits offered by Link-Belt contribute even more to this inherent economy.

LINK-BELT PRE-BILT SECTIONAL BELT CONVEYORS are pre-engineered . . . avoid need for detailed drawings. From standardized data, Link-Belt engineers prepare "on-the-site" quotations. Interchangeable, standardized parts speed selection, reduce purchasLINK-BELT JOB-ENGINEERED BELT CONVEYORS.

As a single source for design, equipment and erection of these systems, Link-Belt spares you coordination problems involving drawings and equipment . . . prevents waste of your engineering manhours.

For full details on both types of conveyors, contact your nearest Link-Belt office. Ask for 40-page Pre-Bilt Catalog 2779.



BELT CONVEYOR EQUIPMENT

LINK-BELT COMPANY: Executive Offices, Prudential Plaza, Chicago 1. To Serve Industry There Are Link-Belt Plants and Sales Offices in All Principal Cities. Export Office, New York 7; Australia, Marrickville (Sydney); Brazil, Sao Paulo; Canada, Scarboro (Toronto 13); South Africa, Springs. Representatives Throughout the World.



FLEXIBLE CUSHION COUPLING

THIS coupling "swallows up" shaft misplacements. It automatically compensates for end-float, parallel misalignment, angular misalignment or any combination of all three. Moreover, it cushions the stresses of shock loads. And it absorbs torsional vibration—reducing noise and protecting machinery from vibration's destructive forces.

Here is a new type of performance—made possible by the development of a tire-like flexing element. Synthetic tension members, bonded together in rubber, give this element the stamina and dependability of modern, high-speed, high-load, shock-absorbing truck tires—and the ability to respond magically to all manner of changing shaft conditions.

Para-flex takes minimum space on the shaft. Mounting is simplified through the use of standard Taper-Lock bushings—no reboring, no machining. Safety is promoted by flush design; there are no protruding

parts. No lubrication is required, no periodic inspection. And since the flexible member is molded with a transverse split, it can be replaced without moving either the driver or driven machine.

Para-flex Couplings are stocked by Dodge Distributors in popular transmission sizes. They are available from factory stock in capacities up to 2000 hp at 1080 rpm. Call your distributor for a coupling to make your own test. You'll witness something revolutionary!



CALL THE TRANSMISSIONEER—your local Dodge Distributor. Factory trained by Dodge, he can give you valuable help on new, conteaving methods. Look in the white pages of your telephone directory for "Dodge Transmissioneer."

NEW SOLUTIONS

period is accomplished by opening damper on exhaust fan, starting a second fan, opening fresh air dampers of the three zones, and closing recirculating air dampers.

This sequence enables temperatures of curing oven to be rapidly dropped to below 200°F, before feeding in additional sheets of material. Holding time for each sheet is about eight hours.

(Double-deck oven was engineered by Industrial Equipment Division of The R. C. Mahon Co., Detroit, Mich.)
Check 1126 opposite last page.

WANTED: NOMOGRAPHS — WORTH \$20 EACH!

Do you have a pet nomegraph that could save time for other CHEMICAL PROCESS-ING readers? If so, send it neatly and accurately drawn, with a double spaced, typewritten description to:

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Chicago II, Illinois

We will pay \$20 for each one accepted and published.

Photocopying speeded, manpower needs cut with machine

Unit makes 13,000 copies per month at Pfizer

A continuous photocopying machine recently placed in service at Chas. Pfizer & Co., Inc., Brooklyn, N.Y. has speeded the production of copies by 250% while cutting labor costs.

Predetermining cycle control enables machine to operate automatically with one-third to one-half the man-power formerly required. Unit is primarily used for copying books, magazine articles, legal

To page 62

egrat

e knife-edge disc in this we working with notched dy outlet shears pulp fi-es to make tight closure. dy and disc of stainless el, and Exelloy stem, prode maximum corrosion sistance. New weightving, short face-to-faceeal for use with light wall ne. The Type 316 cast steel dy is rigid and dimenally accurate. This valve



nmended where corrosion and clogng of pulp lines is a problem. Sizes to in. Get circular AD-2156—see below.

h nickel-chrome stainless valve sulphuric acid



"Craneloy 20" gate valve was speially designed for handling sulphuric acid t elevated temperatures in a wide range concentrations. Unique split wedge disc, re to rotate, gives increased resistance to prosion and wear. Sizes ½ to 12 in.; anged ends. Globe and check patterns also ade. Get bulletin AD-2411. See below.

00-pound bronze valves have ewstrength and safety

Newest design in bronze gate alves features cylindrical lody shape, same as used for high-pressure steel valves. It liminates pinched effect on id rectangular body beween ends and bonnet joint. ermits better, stronger inegration of hex ends and ody; provides wider wrench



rip surfaces. Internally the circular body revents stress concentration by uniformly istributing pressure load on body wall. or more data and literature, write for bulletin AD-2285.

or literature or data on product isted above, please contact E. Catlett, Manager, Chemical Sales Dept. No obligation.



CRANE CO. Industrial Products Corp. 1100 South Kedzie Ave., Chicago 32, Illinois ALVES . ELECTRONIC CONTROLS . PIPING PLUMBING . HEATING . AIR CONDITIONING



processing and engineering data

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Effect of Velocity on Heat-transfer Rates

MRS. PETER D. SHROFF Buena Park, California

An increase in velocity of a stream in an exchanger causes heat-transfer rate to be improved, usually resulting in smaller unit being required. This also results in increased pumping costs because of increase in pressure drop. It is therefore important to determine changes in heat-transfer rate and pressure drop arising from increase in velocity.

Basic equations for heat transfer, by convection involving liquid streams being heated or cooled where Re. No. exceeds 2100, and where no change of phase takes place, are given by:

$$\frac{h_i D}{K} = \left(\frac{DG}{\mu}\right)^{0.8} \left(\frac{C\mu}{K}\right)^{0.88} \left(\frac{\mu}{\mu_W}\right)^{0.14}$$

for liquids heated or cooled inside tubes, and

$$\frac{h_0 D}{K} = \left(\frac{DG}{\mu}\right)^{0.88} \left(\frac{C\mu}{K}\right)^{0.87} \left(\frac{\mu}{\mu_w}\right)^{0.14}$$

for liquids heated or cooled outside of tubes.

From these equations it may be seen that hi, tube-side rate, will change as mass or linear velocity to 0.8 power; ho, shell-side rate, will change as mass or linear velocity to 0.55

It follows that $h_2=h_1$ $(f_\nu)^n$, where: $h_1,h_2=$ coefficients of heat transfer, btu/hr/ sq ft, old and new, respectively

f, = factor by which velocity is increased

n = 0.80, for tube-side coefficient of heat transfer

n = 0.55 for shell-side coefficient of heat transfer

From basic pressure drop equation, it is known that pressure drop will vary as square of velocity. Above equations are represented in nomograph form for ease of handling.

Typical Examples

Example 1 - Shell-side coefficient of heat transfer in an exchanger is 25 Btu/hr/sq ft. If velocity of liquid in shell is doubled, what is new shell rate? Connect 2.5 on h-scale with 2 on the fy-scale. Read 3.66 on ho-scale. New shell rate is 36.6 Btu/hr/sq ft, (line a). Note: In above example:

a) If original shell rate is 250 Btu/hr/sq ft, new shell rate would be 366 Btu/hr/sq ft.

b) If original tube rate is 25 Btu/hr/sq ft and velocity through tubes is doubled, new tube rate is found at intersection of line (a) with h₁-scale. It is equal to 43.5 Btu/hr/sq ft. Or, h, of 250 would increase to 435.

c) Since velocity is doubled, shell-side pressure drop would increase by factor of 4 as found on f.-scale.

Example 2 - If shell-side velocity were reduced 50% (f_v = ½), shell rate h_o of 25 Btu/ hr/sq ft would decrease to 17.1 Btu/hr/sq ft (line b)-tube rate h, of 250 would decrease to 143 (line c)-pressure drop would be decreased by factor of 1/4 (fy-scale).

nomograph on page 63

Putman Publishing Company 1960

APRIL 1960



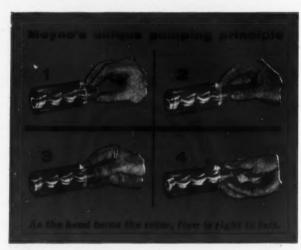
MOYNO, Progressing Cavity Pumps Handle Chemicals that Ruln Other Pumps!

Moyno's unique "progressing cavity" principle and special resistant internal parts slash pump maintenance costs on problem chemicals that ruin other pumps. Any chemical that can be forced through a pipe-from thin watery slurry to extremely viscous rubber dough—can be pumped with a Moyno.

As illustrated at right and in the cutaway model above, a

rugged screw-like rotor turning inside a double-threaded stator forms "progressing cavities" which move chemicals smoothly. Fluids are pumped without turbulence, agitation or pulsation, and discharged uniformly. Rotor and stator materials resist abrasion and corrosion. Hundreds of difficult chemicals successfully handled prove that Moynos show little wear, even after long service. They have increased production and greatly lowered downtime on many jobs where they replaced other type pumps which had run up prohibitive maintenance costs or failed completely. On other jobs, Moynos have succeeded where chemicals were formerly moved by hand or other expensive means because they were considered unpumpable.

Moynos are available in capacities up to 500 gpm; pressures up to 1000 psi. Off-the-shelf replacement parts are always immediately available. To find out how you can decrease chemical pumping costs, write today for Bulletin 40 CP



ROBBINS & MYERS, INC.

meters, household fans, Propellair industrial fans, hoists, Moyno industrial pumpe SPRINGFIELD, OHIO . BRANTFORD, ONTARIO

Check 1128 opposite last page.

NEW SOLUTIONS

From page 60

documents and design and engineering drawings. More than 13,000 81/2 x 11" photocopies are produced each month.

A feature of the machine is the lighting. Four lamps with individual reflectors travel up and down with the subjectholder, giving constant and even illumination. Green lamps



Photocopying machine in operation at Pfizer

provide excellent copying of colors and eliminate need for use of color filters.

Print-making is controlled by pushbuttons on control cabinet. One press of button automatically exposes copy, severs sheet at predetermined size, and develops, washes and dries the paper. Another feature of the unit is constant circulation of developer, which gives the fluid longer life and controls quality of copies.

(No. 4 continuous photocopier is product of Photostat Corporation, 1001 Jefferson Road, Rochester, N.Y.)

Check 1129 opposite last page.

Cellular glass insulation resists temperatures to -150°F

Prevents excessive vapor condensation

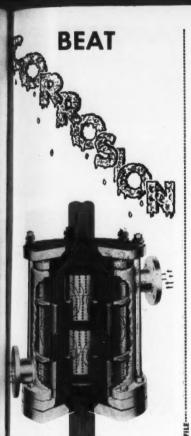
Cellular glass insulation, called Foamglas, is doing an effective job on 15,000' of lowtemperature pipe at a gulf coast petroleum refinery.

Insulation is impervious to vapor and moisture. This characteristic proved important in insulating the vapor transmission lines from refrigerating machinery in the refinery. Two-inch-thick sections of cellular glass were

To page 64



processing and engineering data



WITH "POLYBLOC" HEAT EXCHANGERS

STACKED IMPERVIOUS GRAPHITE BLOCKS

HIGH EFFICIENCY ASSURED BY VERY SHORT PASSAGES AND MIXING CHAMBERS

LOW MAINTENANCE GUARANTEED

NO FRAGILE TUBES

NO CEMENTED JOINTS

Write for free engineering manual



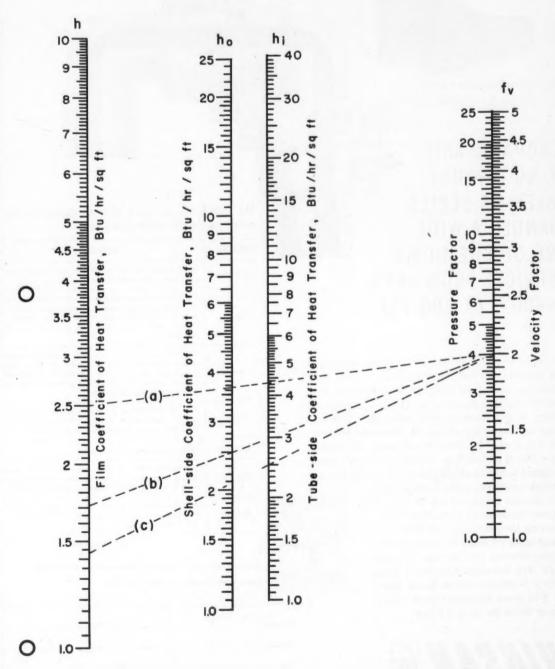
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Effect of Velocity on Heat-transfer Rates

From page 61



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Chemical Processing — April 1960

APRIL 1960

NEW CHIKSAN SWIVEL JOINT

GIVES SAFE, LASTING FLEXIBILITY TO CHEMICAL SERVICE LINES



VIEW ABOVE SHOWS MOLDED PACKING VIEW AT RIGHT SHOWS DISC PACKING

INTERCHANGEABLE PACKING FEATURE **ENABLES DS SERIES** TO HANDLE A WIDE RANGE OF CHEMICALS IN SERVICES FROM -65°F TO +400°F AT 300 PSI

The DS Series swivel joint with its broad service range can be a valuable new tool in your process system. Use it in chemical loading of tank car or tank truck, for stress relief in piping subjected to vibration, expansion or settling, or as a steam rotation connection between stationary and revolving equipment. Wherever you use it, you'll find it pays for itself in extended service life.

Using a disc or molded type packing, this swivel joint can be applied to handle ateam and any of a wide variety

of chemicals processed in your plant. And the split segment feature of the DS Swivel Joint allows replacement of packings without removing the joint from the line.

Buy and apply Chiksan DS Series Swivel Joints for chemical service lines in your plant now. You can select from eight basic styles for full rotation in one, two or three planes. For more information write to Chiksan or fill in the coupon below.



The table below is a quick general reference for the correct packing for specific chemicals:

PACKING	SERVICE
Neoprene	Recommended for alkaline and acid salt solutions and aldehydes such as formaldehyde.
Hycar	These should be used for petroleum derivatives, neutral or slightly acidic sait solutions, dilute acids (Sulfuric to 50%, Hydrochloric and Nitric to 20%), alcohols, glycols, ethers, gases (Oxygen not over 500 psi), and vegetable oils.
Butyl	Recommended for liquid or anhydrous ammonia, gases (except oxygen over 500 psl), ammonia derivatives such as hydrazine and for certain hydraulic fluids such as Pydraul, Skydrol, and Cellulube. It is recommended for acetone and methyl ethyl ketone.
Teflon*	Used for concentrated or fuming acids and other highly oxidizing fluids, esters, aromatics, liquid chlorine, bromine and fluorine if temperature is not excessive.
Asbestos	For use in saturated steam service.
Viton "A"*	Recommended for use with concentrated acids, aro- matics, liquid chlorine, liquid bromine, chlorine or bro- mine derivatives, molten sulfur, and carbon disulfide.
Metallic	For extreme services such as hot gas at 600°F., a Stainless Steel metal disc, specially treated to prevent galling in the second of

R.T.M. DU PONT

CHIKSAN COMPANY, 330 North Pomona Ave., Brea, California

Please send me copy of Bulletin No. 1258

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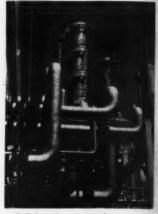
Check 1131 opposite last page.

NEW SOLUTIONS

From page 62

placed around pipe at start of line where temperature 50°F. Temperature drops subsequently to -150°F. Without adequate insulation, vapor condensation would be exces-

Another piece of equipment on which the cellular glass in-



Cellular glass is used on about 15,000' of low-temperature pipe at this refinery

sulation is in use successfully is the refinery's low-temperature fractionation tower. Here hydrocarbons are processed at temperatures ranging from -150 to 160°F.

(Foamglas insulation is product of Pittsburgh Corning Corporation, One Gateway Center, Pittsburgh 22, Pa.)

Check 1132 opposite last page.

Tile plant saves \$3000 by use of magnetic water meters

By-passes need for duplicate control system

Problem: Accurate mixing cycles and constant moisture control are required to produce ceramic tile body material. To achieve this, Pomona Tile Manufacturing Company, Pomona, California, installed a \$3000 automatic moisture control system on the water inlet to one of two mixers. The system worked and it seemed necessary to equip the second mixer similarly.



New Super Series Cowles Dissolvers plenty of power, even at low speeds.

ipped with the exclusive new M P D *
Power Delivery) transmission system, these
offer important profit advantages not availother mixer.

- ges of speed during processing

metall results include great versatility in process-meters with viscosities up to 50,000 centipolses ore, and spectacular production rates in minimum Here are just a few typical examples:

ccessful with most more produce top quality with well-known companies now produce top quality with the content of the content

labor costs.

HENOUSE MILL—COWLES DISSOLVER TEAM

NOS UP" ON LIQUID FERTILIZER PROBLEM

reduces particle size of constituents that do not

ally dissolve to the size that makes for good

ession in a fraction of time required by other

t. After this vitally important operation, the

est Dissolver is used to put together the whole

table spaid production of high quality liquid fer
results.

Mediomerates IN CERAMIC MATERIALS
HINOYED AND SEPARATED IN TEN MINUTES
Gwies with patented impeller used by leading comwer to reduce 50% to 60% suspensions of lump
lul clays to 325 mesh size with amazing speed.
Mode's and "Stacks" are eliminated — plasticity
untrol greatly improved.

VIIVI SOLUTIONS IN 1/2 THE TIME
A special, patented Cowles Impeller is reducing per-latability to only 2 hours. Previous methods required
4 huss. For many materials the Cowles can multiply notime up to 2½ times.

Nome up to 2½ times.

NF-NACE RUG BACKING IN BIG VOLUME

Anating results in production of the revolutionary new

lamed in-place rug padding compounds are reported

in the Cowles. In a single operation, many dry

methials are dispersed to ultimate particle size, let down

felished rug backing and pumped directly to tank

tracks for delivery to rug manufacturers. With the

Cowles, one plant is now set for 200,000 gallons

or month!

let us prove the advantages of Cowles Dis-wivers in your plant — at our risk!

hite us today about your problem.

MOREHOUSE-COWLES, INC. MOREHOUSE 1150 San Fernando Rd. Los Angeles 65, Calif. COWLES

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Dissolvers in pro	cessing (prod	luct)		

Name		. Title .		
Firm				
Address				
City	Zone	State		

*Trademark of Cowles Dissolver Company

Check 1133 opposite last page.



processing and engineering (1313)

Thicknesses of Electrodeposits

J. E. CHILTON and E. F. DUFFEK Stanford Research Institute Menlo Park, California

D. S. DAVIS
Department of Pulp and Paper Technology
University of Alabama

The accompanying nomograph enables rapid estimation of thicknesses of electrodeposits. It is based on the equation:

> L = 2.63 · 10-4 I 8 (atomic weight) D (valence change)

where:

L = Thickness of deposit, thousandths of an inch

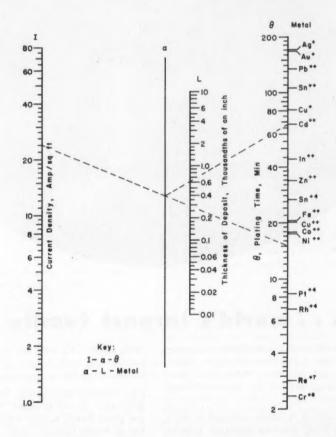
I = current density, amp/sq ft

 $\theta =$ plating time, min

D = density of deposit, grams/cu cm

Typical Example

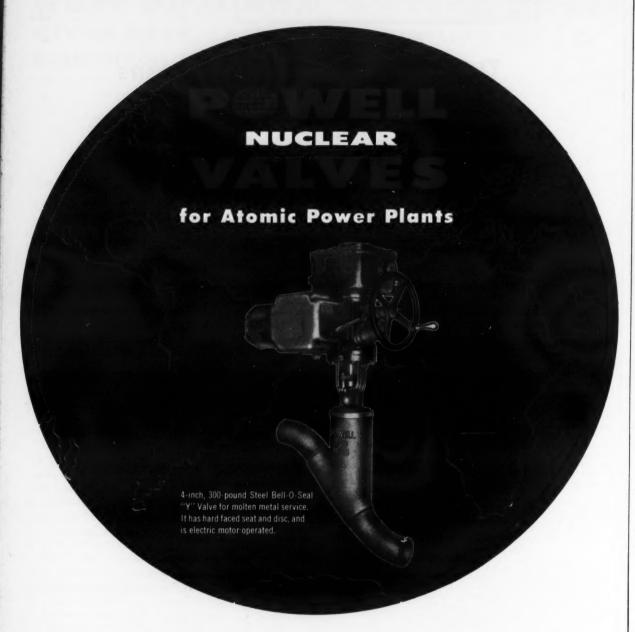
What thickness of cadmium can be deposited electrolytically in 15 minutes at current density of 24 amp/sq ft if current efficiency is 100%? Following key, connect 24 on I-scale and 15 on θ -scale with straight line. Note intersection with a-axis. Connect this point and point for cadmium on Metal scale with straight line. Read thickness of deposit as 0.61 of a thousandth of an inch on L-scale. Multiplication of this theoretical thickness by current efficiency as fraction would give actual thick-



O Putman Publishing Company 1960

Chemical Processing — April 1960

Performance makes the world of difference



Powell . . . world's largest family of valves

Powell has precision-designed special Valves to handle molten metals and other radioactive materials in atomic power plants—vital and hazardous fluids that must pass through the valves without the slightest leakage or failure.

Painstaking quality control is rigidly enforced in every step of manufacture. Every machine operation is accurately gauged. All parts are thoroughly cleaned and degreased. And every nuclear valve is given an actual line test—plus a snifter or mass spectrometer test.

For complete information, consult your Powell Valve distributor. Or call us direct. We'll be pleased to inform you about Powell Nuclear Valves as well as our complete line of Powell Quality Valves.

THE WM. POWELL COMPANY . DEPENDABLE VALVES SINCE 1846 . CINCINNATI 22, OHIO

Check 1134 opposite last page.

NEW SOLUTIONS

From page 64

Solution: Need for second expensive control system was averted when company's chief engineer realized that water flow to second mixer could be manually matched with mixer fitted with automatic system.

A %" water meter was installed on water inlet to each mixer. Flow to second mixer is manually adjusted until



Magnetically-driven water meters accurately measure amount of water going to mixers in tile plant

meter reads the same as meter on the automatically controlled mixer.

Results: Meter accuracy permits matching moisture content within 3/10 of one percent. Meters are magnetically-driven and hermetically sealed to guard against dust. Units have provided trouble-free service since their installation over two years ago.

(S. R. water meters are product of Rockwell Manufacturing Company, 400 N. Lexington Ave., Pittsburgh 8, Pa.)

Check 1135 opposite last page.



"-New type of cracker?"

SONICS PUST OFF

Low frequency vibration

Sound waves are successfully being used to clean duscollector bags at Dragon Ment Company, Division Manerican Marietta Corple Northampton, Pa. Installed on 50,000-cfm glass bag filter serving the plant's No. 1 kiln, the novel technique achieves effective cleaning action with minimum wear on bags.

Called Sonoclean, the system makes use of a sound mechanism whose tone closely resembles a fog horn. Low frequency vibrations are generated which are transmitted to the bags at safe energy levels. Action produces no deflection, creasing, or fatigue of bags. Quivering of bag is imperceptible to the eye. A brief three to five second blast dislodges all dust collected on inner bag surface and reduces pressure differential across bags to a minimum.

The dust collector at Dragon has seven compartments, each holding 56 11½"-diam x 25'-long glass bags — or a total of 392 bags. Kiln exhaust enters system at 600°F. This is reduced to 550°F by the time the gas reaches the bags. Gas volume averages about 50,000 cfm.

System is connected with a cyclone which receives kiln exhaust and extracts low alkali content, returning it to kiln. Gas and remaining dust are blown into the collector through an exhaust duct. Thermostatically controlled inlet valves introduce auxiliary air into the duct to reduce

o 600'F at col-

conic be cleaning articles in the control of with a system inviting compartmental depressurization with reverse air flow. A program timer regulates the bag cleaning operation, maintaining an automatic filtering-cleaning cycle.

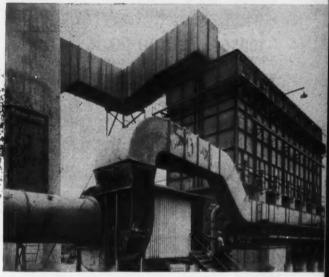
In operation, each compartment in dust collector is on stream for 35 minutes and off one minute for cleaning. Since there are seven compartments, each is cleaned every five minutes. According to the program, air valves shut each compartment off from rest of unit at inlet below bags. Compartment is depressurized with a small reverse air fan, relaxing bags.

Sound system is then actuated and sonic energy cleans the bags. Air valves open and compartment is back on stream, totally clean after only one minute shutdown. Incoming gas, meanwhile, is handled by the other six compartments.

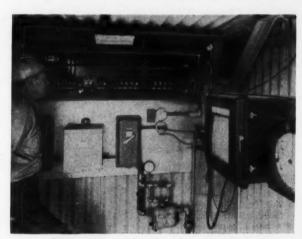
Air-to-cloth ratio during normal operation is 1.47 cfm per sq ft. During cleaning cycle this goes up to 1.71.

Each of the compartments has a trough hopper equipped with an integral screw conveyor which empties collected material into a common screw conveyor for disposal.

Inspection and maintenance is simple. Interior insulation between compartments per-



Giant dust collector at Dragon Cement virtually removes 100 percent of dust from hot kiln gases. Collector's 392 glass fiber bags are cleaned by sound waves



Program timer regulates bag cleaning operation

mits individual sections to be shut off and cooled so that operator can enter and inspect or replace bags when necessary. Other compartments remain in operation.

The dust collector system removes virtually 100 percent of the kiln dust. Over 90 percent of particles are minus five microns in size. System has operated so satisfactorily

that similar units are being installed on the plant's other three kilns.

(Further information about glass bag filters incorporating Sonoclean dust removal system may be obtained from Dracco Division of Fuller Co., 4050 East 116th Street, Cleveland 5, Ohio.)

Check 1136 opposite last page.

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19,000 industrial users depend upon this amazing new chemical tool when some frozen parts tie up valuable machinery or threaten production. They say . . .

"Kroll will loosen almost anything from an embalmer's needle to a bulldozer."

"We have excellent results loosening stuck slides on musical instruments."

"On a 25-year old Bessemer gas engine, two bolts twisted off before . . . after using Kroil, they all came out easily."

"Before trying Kroil on heat treat trolleys we broke off every nut . . . since then, we have not lost one."

You too can get these results. Try KROIL on money-back basis.

Gallon \$4.35; with Kroiler squirt gun, \$5.25, f. o. b. factory.

Ask for GENIUS AT WORK—a free publication full of ideas for maintenance men.

KANO LABS. 1051 Thompson Lane.

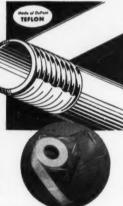
Check 1137 opposite last page.

New Sealer THRED-TAPE

SEALS ANYTHING: chemicals, corrosives, hydraulic fluids, Freon 22, aromatic fuels, solvents, toxics, gases.

ALL TYPES OF PIPE: plastic, aluminum, stainless steel, ceramic, synthetic rubber, carbon.

ALL THREADED CONNECTIONS Temperature range -250° to $+500^{\circ}$ F., pressures to thousands of pounds.











Just cut to length and wrap lightly around pipe. Press overlap to secure and make connection in usual fashion. No mess.

Available in ¼", ½", ¾" and 1" x 288" rolls, also ½" x 576" rolls... packaged in a protective, clear plastic box.

Request sample and full information.



6421 OAKTON STREET, MORTON GROVE, ILLINOIS (Chicago Suburb)
In Canada: Crane Packing Co., Ltd., Hamilton, Ontario

Check 1138 opposite last page.

Recover 85% chemicals with sodium-base pulping process

Simplifies waste handling, ups operating economies

Sodium-base sulfite process that permits recovery of at least 85% of the pulping chemicals is being installed by Rayonier Incorporated at its Grays Harbor sulfite mill at Hoquiam, Washington. The plant will change over from its ammonium-base process at cost of about \$7.5 million. The new process is scheduled to go into operation in 1961.

Company reports that this will be the first commercial installation of its kind in North America. About 500 tons per day of finished chemical cellulose will be pulped. In addition to high heat and chemical recovery and their resultant economic advantages, process will also materially reduce amount of bio-chemical-oxygen demand loading imposed on effluent receiving waters.

Process Description

At Hoquiam, cooking liquor will be a mixed solution of sodium bisulfite and sulfurous acid. Spent liquor from digestion stage will be steam stripped to recover sulfur dioxide following which the stripped waste liquor will be neutralized with caustic or soda-ash.

After filtration, neutralized liquor will be concentrated in multiple-effect evaporators prior to burning in conventional recovery boiler. Inorganic solids present in spent liquor will be reduced in furnace to a smelt consisting essentially of sodium sulfide and sodium carbonate. This will be cooled and fed as slurry to an extraction column.

Differences in solubility of sodium sulfide and sodium carbonate in solution of the two materials make it possible to leach sodium sulfide from smelt slurry and recover sodium carbonate in crystal form from the base extraction column.

Saturated solution of sodium sulfide and sodium car-

CLEANABLE MICROMAZE LIQUID FILTER

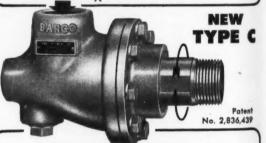


• Now, the cleanability and long life of an all metal filter has been combined with extremely small particle removal. The Air-Maze liquid filter is available in many degrees of filtration, down to 5 microns, Constructed of specially processed wire mesh, filtering media is arranged in form of multiple discs which afford over six

times more effective area than the same size cylinders. Built-in relief valve optional. Sizes from 1.7 to 720 gpm. Write for bulletin LFC-556. AIR-MAZE CORPORATION, Dept. CP-4, Cleveland 28, Ohio. (Subsidiary of ROCKWELL-STANDARD Corporation.)

Check 1139 opposite last page.

Need a rotary joint?



it's BARCO!

For countless applications, Barco's new Type C Rotary Joint will give you the best operating records you've ever had—and for LESS COST!

RESISTS SEAL RING BREAKAGE—The spherical seal ring is under compression, not tension, loading. Self-adjusting for wear. Seal withstands shock loads and alternating hot and cold service.

WIDE SPACED BEARINGS—Two, instead of one... increased bearing area. No lubrication required. Lowest friction.

MULTI-USE—One basic style for all services, single flow or syphon flow, quick availability from LOCAL STOCKS

200 P. S. I. STEAM RATING—Heavy duty service at no extra cost. Eight sizes, ½" to 3". Send for new Catalog 310 today. BARCO MANUFACTURING CO., 537E Hough Street, Barrington, Illinois.

Check 1140 opposite last page.

For continuous thru-put and inventory data —W-C CONVEYOR-SCALE SYSTEMS

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With a W-C Conveyor-Scale System incorporated in your process scheme, you can have up-to-minute thru-put data at any point from incoming transfer to inventory stock-pile. This data, expressed in terms of weight per unit of time, can be totalized for inventory records, process programming, or other manufacturing and accounting functions.

W-C Conveyor-Scale Systems can be supplied for flat or troughtype belts, fixed or variable speed, in capacities from 20 to 1000 tons per hour for new or existing conveyor installations. Each is a job engineered system employing standard, unitized components. As a result, you get a "custom" system at an "off-the-shelf" cost.

Typical applications include: Controlling feed and blending of formulation materials such as naptha, phosphates, metal ores, etc.

Write for new Bulletin 60



WEIGHING & CONTROL COMPONENTS, INC. Div. of CompuDyne Corp.

E. County Line Road • Hatboro 10, Pa.

Check 1141 opposite last page.

bonate remaining after separation of sodium carbonate crystals will be fed to carbonation unit where the sodium sulfide will be reacted step-wise with carbon dioxide to produce additional quantities of sodium carbonate.

Sodium carbonate solution from carbonation step plus sodium carbonate crystals recovered from extraction column will be used either to make up cooking liquor or as material to neutralize unconcentrated sulfite spent liquor.

Hydrogen sulfide will be produced in the carbonation step. This will be recovered and burned to get pure molten sulfur. This will be burned in conventional burners for preparation of cooking liquor. (Further information about sodium-base pulping process may be obtained by writing to Rayonier Incorporated, 52 Vanderbilt Ave., New York 17, New York.)



Yankee fuel element . .

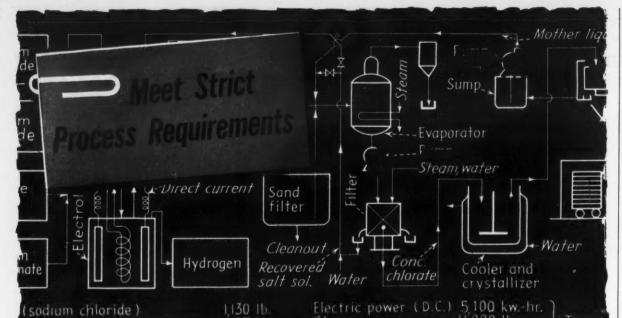
... gets final inspection before being shipped to atomic power plant being built at Rowe, Mass. When completed late this year, Yankee Atomic Electric Company's 134,000 kw plant will have 76 such fuel elements in its pressurized water reactor. Each unit is about eight feet long and eight inches square. Made of 304 stainless steel, every tube in the assembly contains 150 pellets of slightly enriched uranium oxide.

(Nuclear reactor and its related components are being supplied by Westinghouse Electric Corporation, Pittsburgh 30, Pa.)

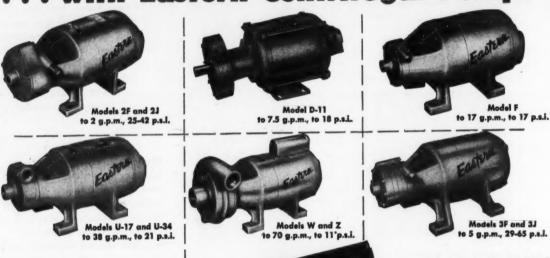


Check 1142 opposite last page.

69



with Eastern Centrifugal Pumps



Milime

Recent redesign of these close-coupled Centrifugal Pumps has gained tremendous ruggedness and allowed for a wide selection of power requirements. In every detail of size, weight, space requirements, power, and costs, Eastern pumps fill the bill for strict process standards.

Six standard models range from 1/8th to 3/4 H.P., with capacities up to 70 G.P.M., pressures to 65 P.S.I. Eastern Centrifugal Pumps are available in Cast Iron, Bronze, Stainless Steel, Monel, and Hastelloy "C".

Eastern's engineering service offers many special models to meet your specific needs as to capacity and construction. Recommendations entail no obligation, and your inquiries are invited. NEW EASTERN CATALOG Eastern Centrifugal Pump Catalog contains engineering data, performance charts, diagrams and helpful general information. Request Bulletin 130-E.

INDUSTRIES, INC.

100 SKIFF ST. HAMDEN 14, CONN.

Check 1143 opposite last page.

Dielectric heaters speed, improve polystyrene bead expansion process

Permit use of reusable nonmetallic molds

Dielectric heating coupled with the use of an efficient catalyst is replacing expensive steam molds and speeding the heating and cooling cycles associated with the forming of polystyrene products.

The catalyst, developed by Koppers Company, Inc., is what causes polystyrene beads to expand (polystyrene itself will not heat in a dielectric field). Rapid dielectric heating within pressure-tight molds results in products which exhibit lightness strength, moisture resistance, and high insulating qualities.

Heater reaches necessary high temperatures in seven to 12 seconds. At present, units with rating of 20, 25, and 30 kw are used. Cooling is quickly accomplished by means of air.

Another advantage of the dielectric heating process is that it permits use of nonmetallic molds, which can be used over again. These are also less expensive than precision machined metal molds.

Products that can be formed with the dielectric technique include packaging containers, furniture, dashboard padding, and insulated paneling. Maximum diameter of molds currently used is 18". The new process indicates that applications may be broadened to include even such large items as 8 x 12' building panels.

(Dielectric heaters are product of Allis-Chalmers Manufacturing Company, Milwaukee 1, Wisconsin.)

Check 1144 opposite last page.

Device makes pure H₂ from dissociated NH₃ at low cost

Economic production of ultrapure hydrogen from dissociated ammonia is reported possible with the aid of a recently developed unit. Operating on principle of hydro-

gen diffusion through palladium, device can produce about 70 cu ft of hydrogen from every 100 cu ft ammonia gas fed into it. Ninetythree percent of the hydrogen in dissociated ammonia is diffused as purified gas.

Impurities are said to be so low they cannot be detected by any known method of analysis. Product does not contain any measurable traces of nitrogen, inert gases, hydrocarbon, water vapor, sulfur or any of the other containments commonly found in commercial cylinder hydrogen.

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Production costs are reported to be low. According to manufacturer, savings in most cases can be substantial enough over a one year period to cover cost of equipment, installation, maintenance, and depreciation.

Unit also permits hydrogen to be produced from byproduct gas streams that contain appreciable quantities of hydrogen, providing contaminants present do not affect palladium metal. Commercial grade hydrogen can be purified with the equipment too.

(Further information about hydrogen palladium diffusion purifier may be obtained from Engelhard Industries, Inc., Newark, New Jersey.)

Check 1145 opposite last page.

Plant will make power from natural steam

Natural steam will be used to produce power in new plant being built in Venezuela. Chemical Natural Resources, Inc., Dover, Del., has concluded an agreement with the Venezuelan Government for use of the natural steam discovered by Venezuela Sulphur Corporation, a subsidiary of CNR at Costa Mara, Venezuela.

For more information on developments reported in this section, check corresponding numbers on Reader Service Slip opposite lest page of this issue. ALEMITE BARREL-TO-BEARING LUBRICATION

the "moving force" of

More and more, cost-conscious plant men are recognizing modern lubrication as an important "production tool." No longer do they see it as a simple maintenance problem.

With the years-ahead Alemite Barrel-to-Bearing Lubrication method, today's leading manufacturers are stepping up production ... reducing downtime ... extending machine life.

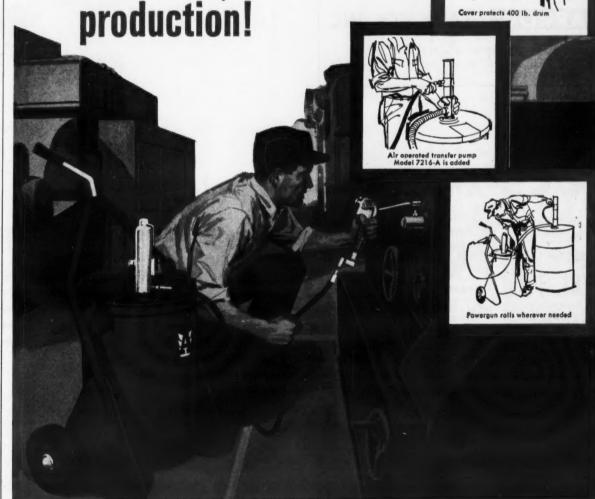
Included in a complete Alemite barrel-to-bearing lubrication method can be electric, air or hand-operated equipment. It will more than meet every need for high-pressure lubrication, filling hydraulic systems, servicing oil reservoirs, lubricating gear housings, and refilling grease guns.

Write for free Alemite catalog today!



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Check 1146 opposite last page.

CORROSION-RESISTANT WOODEN STORAGE and PROCESSING EQUIPMENT



- TANKS round, rectangular
- Fiberglas, PVC, and lead-lined WOOD
- Filter Press PLATES and FRAMES
- Scrubbing TOWERS and DEGASIFIERS
- **Dry Product SILOS**
- **Gravity TANKS**
- Vacuum FILTERS
- Fume STACKS
- Wood PIPE

Write for our new "Wood Tank Engineering" HANDBOOK Your inquiries will receive our prompt attention.

TANK CO., INC.

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Check 1147 opposite last page.



FREE TEST SAMPLE PROVES HOW!

You'll save countless man hours and avoid costly replacement of broken studs, bolts, etc., with the protective cushioning action provided by the colloidal copper composition of G5-A. Improved C5-A. Lubricates and Seals for fast, easy application and removal. Gives same protective performance even after high-pressure, high-temperature use, up to 1800° F. Can be used on all metals and plastics.

FELT PRODUCTS MFG. CO.

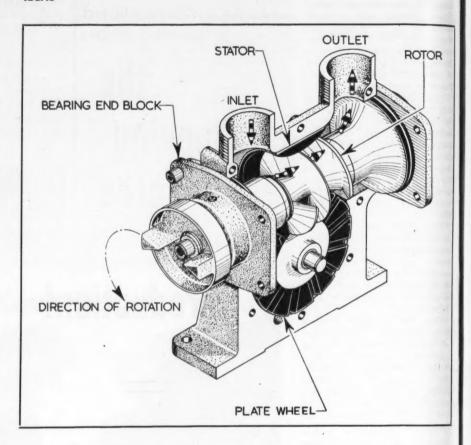
PELT PRODUCTS MFG. CO. Dept. 54, 7450 N. McGarmick Blvd., Skekie, III

- Ends seizing and galling even up to 1800° F.
- Reduces wrench torque
- Stops needless stud breakage Permits repeated re-use
- Speeds assembly and disassembly
- Prevents galling of stainless steel TRY CS-A NOW ...

In chemical plants, you'll find C5-A used to protect hot pump studs, autoclaves, reactors, crackers, heat exchangers, etc. Write for your free test sample today!

Check 1148 opposite last page.

IDEAS



Pulseless pump employs Archimedean principle

Non-foaming, positive-displacment unit which operates with a squeegee, wiping action can handle crystals without damaging them, high-viscosity products, abrasives and liquids with entrained air

R ECENTLY developed positive-dis-placement pump is adapted from a 2000-year-old Archimedean screw principle. Design utilizes the wiping action of an elastomer-bonded steel plate wheel in a variety of materials on a steel rotor or screw. Operation is similar to the squeegee action of a windshield wiper. Rotation on present models is reversible.

Tapered roller bearings on both ends of rotor shaft permit pump to operate at the relatively high speed of up to 3600

rpm. Pump is pulseless and non-foaming because of the axial flow principle. It will handle liquids with a considerable amount of entrained air.

Field Tests

In one field test at a sugar refinery, pump was used for handling magma, a suspension of sugar in viscous molasses. Material is comparable to asphalt in viscosity and abrasiveness. Examination of crystals under microscope showed that they were not ground or damaged in any way by pump. Abrasive action of crystals caused only a negligible amount of wear on pump.

In another field test at a cosmetic manufacturing plant, liquid shampoo was pumped without foaming product. Pump has handled viscous sand containing abrasive wax, with a 250,000 SSU viscosity. Among other products successfully handled by pump are latex, clay slip, paint, paper stock, beer and wines.

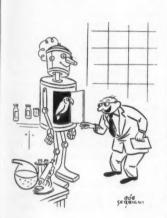
Construction Materials

Pump is presently available in meehanite, bronze, aluminum, and all stainless steel, with Buna N rubber-bonded parts. Plans for bonding Viton and polyurethane are being developed.

Three sizes are presently offered with capacity of 15, 42 and 220 gpm. Each has a maximum discharge pressure of 100 psi and is capable of suction lifts to 29 feet.

(Positive-displacement pump is product of Goodyear Pumps, Inc., Nine Rockefeller Plaza, New York 20, N.Y.)

Check 1149 opposite last page.



"Now, once more: Brother scientists and fellow chemists, we are assembled here this evening..."

top

CONSOLIDATED SAFETY RELIEF VALVES have a special "O" Ring Seat Seal that stops leakage completely



Consolidated Safety Relief Valves are available in both Standard and Balanced Bellows design for extreme corrosive applications.

tightness

The Seal is a resilient ring set in the valve disc. It maintains no-leak tightness by contact with a specially curved seating surface on the valve nozzle, yet does not carry the seat load imposed by the valve spring.

Tightness is maintained at operating pressures far closer to set pressure than with metal-to-metal seats alone. Tight closure is as efficient after "simmer" as on normal blowdown. Piping strains are absorbed far better by the resilient seal than all-metal seating. If the tough seal is ruined by entrained abrasives, replacement is

easy. Seals are available in materials that resist corrosive fluids. Maintenance costs are greatly reduced.

Standard Consolidated Safety Relief Valves have an eductor tube that removes pressure from the closed bonnet. Only the spring controls valve action. You get guaranteed capacity ratings and highest dependability—absolute protection for personnel and equipment. Additionally, there is the economy of converting the Standard valve to the Balanced Bellows type in your own shop. Get complete details. Write for Bulletin 1940.



CONSOLIDATED SAFETY RELIEF VALVES A product of MANNING, MAXWELL & MOORE, INC.

Consolidated Ashcroft Hancock Division • Tulsa, Oklahoma In Canada: Manning, Maxwell & Moore of Canada, Ltd., Galt, Ontario

Check 1150 opposite last page.



You can use this new Foxboro pneumatic transmitter on <u>six</u> different process measurements

pressure – temperature – liquid level – differential pressure – dew point – flow . . . all six with guaranteed accuracy of $\pm \frac{1}{2}$ of 1%

Think of it . . . a universal pneumatic transmitter with matched elements for six different process variables. That's the new Foxboro M/45 pneumatic indicating transmitter.

And with the M/45 you get: universal high accuracy-guaranteed at $\pm \frac{1}{2}$ of 1%; universal ambient temperature stability

— less than ½ of 1% in 50°F temperature change; universal calibration and simplicity of servicing. A remarkable combination of versatility and uniformity in a single instrument.

The new Foxboro M/45 indicating transmitter can extend the benefits of standardization throughout your whole

plant operation. Ask your Foxboro field engineer to tell you about it. Or write for Bulletin 13-30. The Foxboro Company, 814 Neponset Ave., Foxboro, Mass.



Check 1151 opposite last page.

IDEAS

Electrolytic process may make titanium less expensive

Produces high-purity crystals from titanium carbide

More economic production of titanium metal may be possible with the development of electrolytic process for making ductile titanium.

Resulting from seven years work by three-man research team, process utilizes titanium



Pilot cell used in electrolytic process for producing ductile titanium

carbide which contains about 80% titanium. Titanium carbide is commercially available, and comparable in price to titanium tetrachloride.

For the experiments, a pilot cell consisting of a graphite crucible lined with titanium carbide rings which formed the anode, was used. Metal cathode was suspended in crucible concentric with the anode. During electrolysis, titanium was separated from carbide and deposited on cathode in form of fine dendritic crystals. Chemical analysis of crystals indicated purity in the order of 99.6%.

Atmosphere of argon was used in crucible to prevent oxidation. Experimental cell made batches up to 12 lb. Direct current was applied to cell at 4v, 800 to 100 amp. Eight to 10 kw-hr were required to produce pound of titanium.

(Titanium process is development of Norton Company, Bond St., Worcester, Mass.)

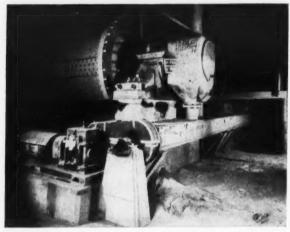
For more information on product at right, specify 1152 ... see information request blank opposite last page.

ROCTOR Drying Equipment for the bod, Chemical and Process Industries...
Conveyor Dryers, Spray Dryers, Tray Dryers
Truck Dryers... Continuous Automatic
Production of the World's Finest Products



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The Arithmetic of Materials Handling



BEFORE: Dirt, noise and mechanical breakdown were constant problems in this cement plant, where two mechanical conveyors were used to collect raw materials. A 5 h.p. motor driving auxiliary equipment wasted valuable space and power, required frequent maintenance. Spillage clean-up wasted costly man-hours.



AFTER: Clean, simple, quiet. Notice the difference two 8" F-H Airslide® fluidizing conveyors have made. No dangerous moving parts. Nothing to lubricate. Auxiliary equipment and foundations are gone. Power needs are now only \(\frac{1}{8} \) of previous needs. Fluidizing saves wear and maintenance.

AIRSLIDE® Fluidizing Conveyor minimizes material loss . . . maintenance . . . moving parts

If you are now handling dry, pulverized materials, the F-H Airslide Fluidizing Conveyor can help you stop noise, and airpollution, as well as speed flow and reduce maintenance cost.

Simplicity Itself

F-H Airslide conveyors fluidize dry, pulverized materials with low pressure air.

These materials literally flow at high speed, down the inclined conveyor. Power requirements are small.

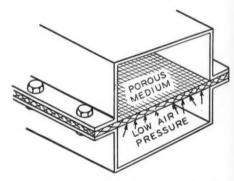
Flexibility, Low Cost

For unlimited applications, Airsline conveyors take up little space, and can be used singly and in combination with other Fuller pneumatic conveying systems. The movement of fluidized material can be around corners, between floors, through walls—nearly any conveying distance.

Better Housekeeping

Can Fuller conveying systems help eliminate your housekeeping problems—cut your maintenance and handling costs? Write today, outlining your problem in handling dry, finely-divided materials. Fuller will gladly make appropriate recommendations.

"Pulverized Materials Flow Like Water!"



FLUIDIZING PRINCIPLE: Porous supporting medium divides conveyor section into two "compartments". Dry material flows down inclined conveyor, fluidized by low-pressure air entering beneath porous medium.





FULLER COMPANY

136 Bridge St., Catasauqua, Pa.
SUBSIDIARY OF GENERAL AMERICAN TRANSPORTATION CORPORATION

Offices in Principal Cities Throughout the World

4483 FH 5 "See Chemical Engineering Catalog for details and specifications".

Check 1200 opposite last page.

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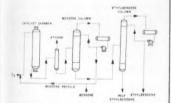
High C₂H₄ conversion with solid phosphoric acid catalyst

Yields 99.9% ethylbenzene, minimizes side reactions

Ethylbenzene is being produced at El Paso Natural Gas Company with the aid of a more efficient solid phosphoric acid catalyst. After seven months of operation on original catalyst charge, unit was still giving 70% ethylene conversion rate.

Initial conversion was 98%. The drop in conversion will be improved in the future by increasing catalyst loading, making other minor changes. Ethylbenzene produced by the technique has 99.9 plus percent purity.

Although full details are not available, it is known that the catalyst is a composite of phosphoric acid and kieselguhr. By varying the proportions of the constituents and



Simplified flow diagram of ethylbenzene unit at El Paso Natural Gas Co.

using a new manufacturing technique, the catalyst was developed. When used for ethylbenzene production, moderate temperatures and high pressures are employed. Catalyst can also be used to produce cumene.

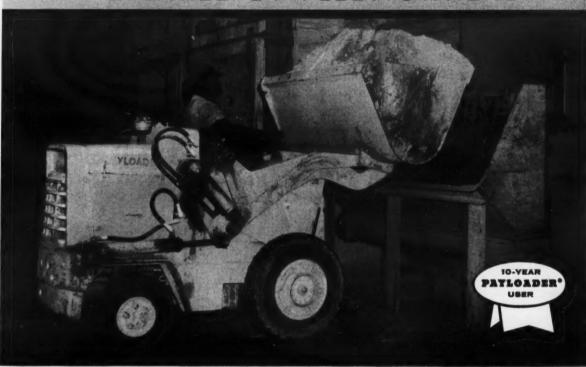
Catalyst shows high activity toward primary alkylation reaction; lower activity toward undesirable polymerization side reaction.

The ethylbenzene unit at El Paso Natural Gas consists of a feed absorber, reactor, gas separator, benzene fractionator, and ethylbenzene fractionator.

Feed absorber takes total C₂ and lighter gases from propane cracking unit and absorbs them in benzene. Resulting liquid is then passed

PAYLOADER°

PREFERRED BY FLEET OWNERS



245 FLEETS Among CHEMICAL and FERTILIZER companies in the United States and Canada operating 3 or more "PAYLOADER" units totaling . . .

3102 MACHINES

In addition to the fleet owners, thousands of individual owners have made "PAYLOADER" tractor-shovels the overwhelming favorite throughout all phases of the chemical and fertilizer industries. Fleets ranging as high as 230 machines are proof of owner satisfaction with "PAYLOADER" performance, service and dependability.

Typical of the many fleet owners, is the fertilizer plant of C. ROY CURTIS & SON of Marion, New York, with a fleet of 5 "PAYLOADER" machines dating back to 1950. All 5 machines are still in use. Says Roger Hubright, Plant Supt., "We have been using "PAYLOADER" machines

continuously for the past ten years, with very satisfactory all around production and mechanical service. We like the large load carrying capacity of our H-25 with its compact design which enables us to increase hauling output without modifying other plant facilities. H-25 has plenty of power and it's easy to operate."

You too will find a "PAYLOADER" a steady, dependable performer, with many exclusive features which contribute to greater output at lower over-all cost. Choose the exact machine to fit your needs from 20 models. Send for complete details.

HOUGH

THE FRANK G. HOUGH CO.
LIBERTYVILLE, ILLINOIS
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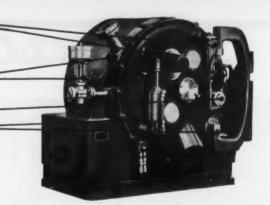
THE FRANK G. HOUGH CO.
744 Sunnyside Avenue, Libertyville, III.
Send data on new H-25 "PAYLOADER".
Name
Title
Company
Street
City

Check 1201 opposite last page.

All parts which control action inside are located outside-no danger of contamination, corrosion or erosion to pneumatic or hydraulic equipment, etc. Process piping extends through vessel walldoor opens without piping disconnection. Simple external adjustments of knife, cake, etc. Finger-tip double-acting door, automatic

positioning; effective pressure closure; positive locking.

Built to handle full 150 HP, in high capacity, day-in, day-out operation.



PROVEN PERFORMANCE!

FOR EXTRA HIGH PURITY AND SOLIDS DRYNESS

(even on slow draining, compressible fine solids)

Full hydraulic rotary-action knife unloads -300-400 lbs. load in 2-8 seconds with full

Six-section knife blade, easily adjustable and replaceable by identical sections at low cost.

Full-flow, air operated feed system delivers slurry uniformly across full width of basket. Multiple rinsing system; disconnect rinse tube internally without disturbing external piping.

Large screen area; thin even layer of solids under high centrifugal force, gives up liquid quickly without compaction. Teflon "splash seal" (hidden) prevents flow-back of crystals into mother liquor.

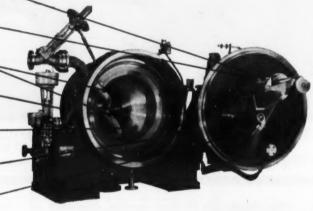
Smooth action cake leveler balances load: easily adjustable to control cake thickness. Precision drive and bearing assembly; sealed housing with pressure lubrication system

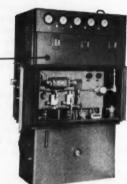
from control cabinet.

Continuous cyclic operation at full speed, with fully automatic control. Any part of the cycle may be adjusted while the machine is in operation.

Over a dozen C-41 Super-D-Hydrators already are proving themselves profitable workhorses in the deliquefication of such sensitive materials as the polyolefins and other hydrocarbons where high purity and extreme dryness are the byword.

In the C-41 you are sure of full power, flexibility, ruggedness, and proven performance. Write for Bulletin 1286 for full details.





Centrifugal and Process Engineers

2300 WESTMORELAND STREET / PHILADELPHIA 40, PENNSYLVANIA NEW YORK-PITTSBURGH-CLEVELAND-DETROIT-CHICAGO-HOUSTON - SAN FRANCISCO - LOS ANGELES - ST. LOUIS - ATLANTA Associated Companies and Representatives throughout the World

IDEAS

tom.

through feed heaters into the solid phosphoric acid catalyst. From this reactor effluent stream, the C2 and lighter gases are separated. Benzene fractionator removes benzene which is recycled back to reactor. Ethylbenzene column

Approximately 17,700 gpd of ethylene and 19,400 gpd benzene are used. This produces about 25,800 gpd of ethylbenzene. Bottoms account for another 2000 gpd.

separates product from bot-

(Further information about ethylbenzene process using UOP #4 catalyst may be obtained from Universal Off Products Company, 30 Algonquin Road, Des Plaines, Ill.) Check 1203 opposite last page.

NEW LITERATURE

Ideas and New Trends

Technical data on release and separating papers is listed in four-page file folder. Description of four types of coatings are also included. Riegelease Bul — Riegel Paper Corporation.

Check 1204 opposite last page.

Inconel heat exchanger tube designed for nuclear applications is covered in three-page specification sheet. Spec STC-107 — Superior Tube Company.

Check 1205 opposite last page.

Plant tour of recently expanded facility for manufacturing chemical intermediates and specially real intermediates and specially formulated products is provided by 12-page illustrated brochure. Jumbo-size photographs show 106-acre plant location at Newport, Tenn. "Crestwood Chemicals" — Chemical Products Division Chemical Products Division Computers, Correction sion, Chemetron Corporation.

Check 1206 opposite last page.

Agriculture applications of radio-isotopes are discussed in 200-page report prepared by Stanford Research for AEC. Report estimates that minimum of \$180 million annually for the next 20 years can be saved through use of radioisotopes in agricultural research.
"Radioisotopes At Work For Agriculture" may be obtained for \$3.50 from Office of Technical Services, Department of Commerce, Washington 25, D.C.

Binary phase diagrams of 27 uranium alloys are included in 76-page book. Designed to accumulate current information on the uranium alloy phase of the nuclear energy field, the book includes a bibliography of 470 references. Tables and graphs showing behavior of uranium alloys under corrosion and irradiation are also included. "Selected Data on Uranium Alloys" may be obtained by remitting \$1.00 direct to Sylvania-Corning Nuclear Corporation, Bayside, L.I., New York.

Plastic molding, as done by nine different thermoforming techniques, is outlined in detail in 22-page bulletin. Total of 20 drawings are used to illustrate the methods. "Thermoforming Techniques" — Comet Industries.

Check 1207 opposite last page.

Guidebook, consisting of 22 pages, has been published on the application of porcelain enamels to aluminum. Alloy selection, metal preparation, choice of frit, slip formulation, enamel application, and firing are covered. "Porcelain Enameling of Aluminum" — Reynolds Metals Company.

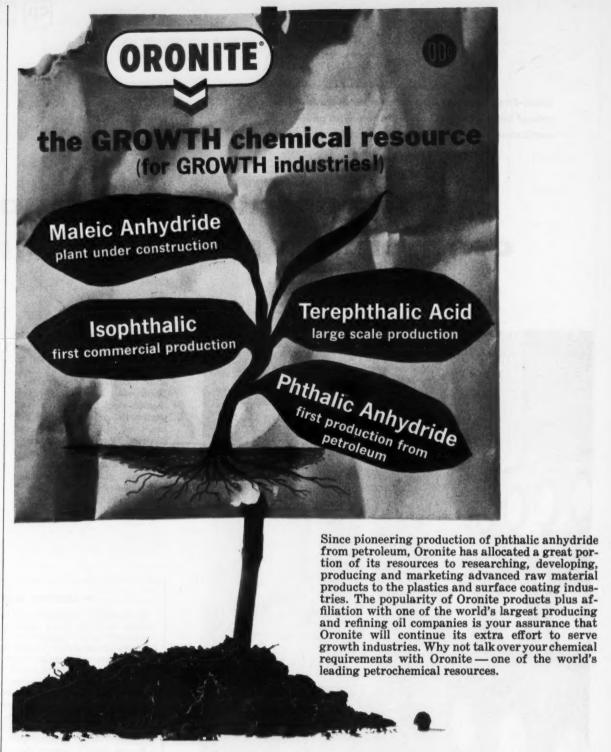
Check 1208 opposite last page.

Wall chart of conversion factors includes common conversions such as inches to centimeters, watts to hp, and many conversions that are difficult to locate in reference manuals. Wall Chart — Precision Equipment Co.

Check 1209 opposite last page.

How to set up a quality control and technical development laboratory is covered in four-page leaflet. Tax advantages that can be realized from setting up such a group are also covered. Copies of leaflet "Setting Up a Quality Control And Technical Development Laboratory" may be obtained free from Small Business Administration, Washington 25, D.C.







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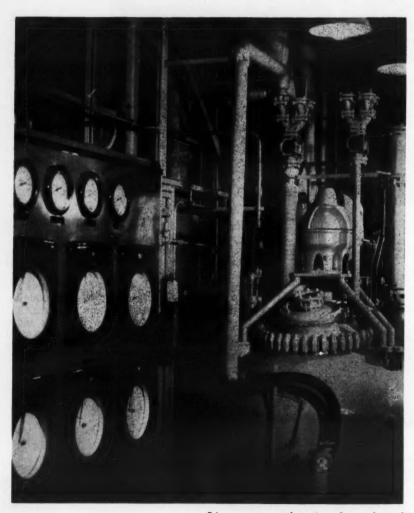
Foreign Affiliate: California Chemical International, Inc., San Francisco, Geneva, Panama

Check 1210 opposite last page.

ср

Glass-lined reactors step out of their more familiar role of batch-method vessels to join with pneumatic controllers and valves in an . . .

Automatic, continuous ammonium perchlorate process



Primary reactor and portion of control panel for American Potash and Chemical Corp.'s 40 ton per day ammonium perchlorate process

Solid propellant rockets riding spaceward often use ammonium perchlorate as an oxidizer. At American Potash and Chemical Corporation's Henderson, Nevada, plant, glassed-steel reactors and pneumatic control system are heart of continuous process for perchlorate manufacture. This is an unusual example of application of standard, agitated, glassed-steel reactors, normally associated with batch methods, to a continuous process.

Ammonium perchlorate (40 tons/day) is made by reacting 56% sodium perchlorate solu-

tion (8200 lb/hr), anhydrous ammonia (640 lb/hr), and 35% hydrochloric acid (3900 lb/hr) in a recycled water solution. Reaction takes place at a pH of 5.5 in a 1000-gal, glassed-steel, jacketed, mechanically agitated vessel, with a 20 minute retention time.

Steam and water are automatically mixed in vessel jacket to maintain an operating temperature between 160 and 180°F.

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Flow of each reactant is measured by means of an orifice plate and diaphragm differential-pressure cell. Flow rate of sodium perchlorate is

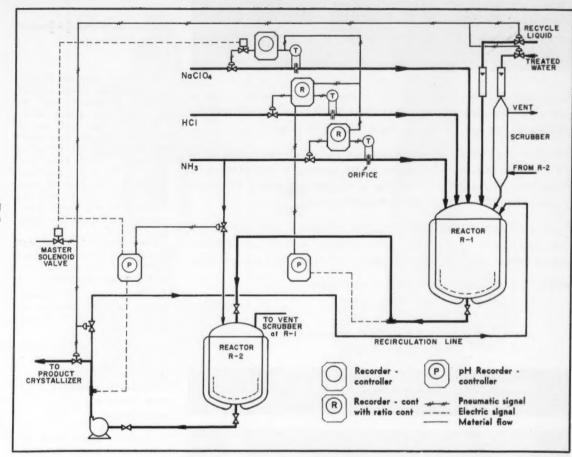
A Leading Role In Space Race

A substantial contribution to the United States effort to probe outer space is being made by ammonium perchlorate, most generally used oxidizer for solid propellant rockets. During missile development period since World War II, potassium perchlorate was primary oxidant for several years but it has been replaced in more recent years by ammonium perchlorate. Major portion of ammonium perchlorate produced today is manufactured by American Potash & Chemical Corp., at its Henderson, Nevada, electrochemical plant.

In addition to ammonium perchlorate, Henderson plant also manufactures sodium chlorate and potassium chlorate, potassium perchlorate and manganese dioxide.

A new AP&CC sodium chlorate plant began production early in 1959 at Aberdeen, Miss., with an announced capacity of 15,000 tons per year. Shortly after mid-year, plans were revealed to increase plant's output by 50%, to 22,500 tons per year.

Any part of this sodium chlorate output can be converted to perchlorate production upon demand, thus indicating that American Potash will continue to be the major producer for some time to come.



Simplified diagram of control system for primary ammonium perchlorate formation

established as primary, and flow rate of other reactants ratioed automatically in proper fixed proportions. Pneumatic, force-balance, recorder-controller regulates flow of NaClO₄. Similar instruments, additionally equipped with a ratio control, maintain proper flow of ammonia and HCl.

As process stream discharges from primary reactor, pH reading is taken continuously and ammonia automatically added in smaller (750 gal) agitated glassed-steel reactor which serves as pH adjustment tank. The pH is measured again as it leaves this reactor for crystallizer.

If pH or other process variables stray off set point, master solenoid shuts off reactant feed and opens recirculation line to return discharge to primary reactor. Recirculation continues until errant variable is back on set point. With all variables on set point, flow is again directed to crystallizer.

Crystallizer is 316 stainless, vacuum cooled. It operates on a continuous basis to cool mixture from 160-180°F to 95°F. Feed liquor is continuously added to mother liquor and resulting solution routed to vaporizer where it becomes supersaturated. Crystal growth occurs as this solution flows upward through a dense suspension of crystals.

Slurry containing desired size distribution is removed

steadily and fed to ammonium perchlorate centrifuge where mother liquor is removed and remaining crystals washed. Crystals then go into a reslurry tank of saturated ammonium perchlorate solution. This reduces chloride concentration of solids and acts as a transfer medium for ammonium perchlorate to subsequent drying operation.

Perchlorate is recovered from reslurry tank by centrifuging a slurry of approximately 25% perchlorate in crystal form and some 19% in solution. Mother liquor is recycled, while a flash dryer centrifuge lowers moisture content of crystals to about 0.5%. Crystals then go to a three-stage vibrating pan dryer which reduces moisture content to 0.02%. Dried crystals feed over a double-deck screen to remove offsize product. Acceptable ammonium perchlorate crystals then are packaged. Rejects return to reactor where they are recrystallized.

Sodium Chloride Separation

Wash water, mother liquor and overflow solution from crystallizer are collected from ammonium perchlorate centrifuge and sent to sodium chloride crystallizer. Mother liquor is concentrated by removing sodium chloride slurry from crystallizer to a centrifuge, where solids are dissolved and pumped to waste.

Wash water and mother liquor from centrifuge then are mixed in a surge tank with crystallizer over flow and pumped to reactor system as recycle. Washed sodium chloride containing less than 0.1% ammonium perchlorate is discharged from continuous centrifuge.

In addition to reactors,

scrubbing column for reactor vapors and interconnecting piping between two reactors are of glassed-steel. Control valve for HCl flow has a Kel-F diaphragm and glassed-steel body. Pipe and fittings handling HCl vapors are Hastelloy Alloy B, as is the HCl circulating pump.

Pipe line for HCl feed is saran lined.

(Primary reaction portion of ammonium perchlorate process, including reactors and instrumentation, was supplied by The Pfaudler Co., Div. Pfaudler Permutit Inc., Rochester 3, New York.)

Check 1211 opposite last page.

(Pneumatic recorder-controllers, differential-pressure cells, and control valves are product of The Foxboro Company, Foxboro, Mass.)

Check 1212 opposite last page.

ORBIT ABOS NEW VALVES TO THE LINE DRUIT CAST STEEL VALVES FOR MYDEOGEN AND AIMIL AS INDUSTRIAL BASES

As an addition to our line of valves handling hydrogen, similar industrial gases, and hydrocarbons, Orbit Cast Steel Valves have proven ideal for compressor, manifold, offsite and block valve installations.

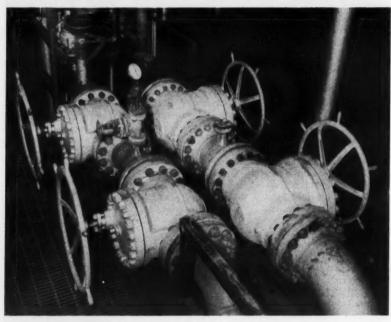
Orbit Cast Steel Carbon Trimmed Valves are particularly well suited to all the operating problems attendant to safest handling of industrial gases. These valves employ Orbit's friction-free seating principle already well known to users of our Forged Steel line of Industrial Valves.

All principal parts of Orbit Cast Steel Valves are made of steel castings and steel drop forgings, with bonnet bolted to body. A stem locking device permits valve to be locked open or closed. 2½ to 3 turns opens or closes valve.

SIZES: 5", 6", 8" & 10" *Series 300 and 400 Flanges 5", 6" & 8" *Series 600 Flanges 5" & 6" *Series 900 Flanges

Above sizes except 10" available in Screwed Ends. *End to End Dimensions are Special.

ORBIT CAST STEEL VALVES INSTALLED ON HYDROGEN GAS COMPRESSOR MANIFOLDS IN A LARGE OHIO REFINERY.





Available through your favorite industrial supply house. Or, write Orbit today for complete information and specifications.

ORBIT VALVE COMPANY

P. O. BOX 699, TULSA, OKLAHOMA PHONE LUther 4-4761, TWX TU 925

Check 1234 opposite last page.

INSTRUMENTS & LAB

Temperature measurement at liquid nitrogen levels

Uses: With standard laboratory equipment, measures temperature gradients down to liquid nitrogen-oxygen range.

Features: Low resistance of thermistor permits easy reading of values, 100,000 ohms $\pm 50\%$ at -195°C. Time constant (in liquid N_2) less than one second. Dissipation constant @25°C, 1°C in still air, 5 mw/°C in still water. Temperature coefficient @-195.8°C, -20%/°C.

Description: Bead-type thermistors in form of beads, glass probes, and high-pressure insertion probe assemblies.

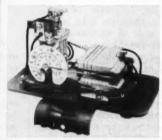
(Lox thermistor 05A8 is product of Victory Engineering Corp., PO Box 373, Union, New Jersey.)

Check 1214 opposite last page.

Transducer simplifies flow readout and control

Linearizes signal from differential pressure flow transmitter

Uses: Converts pneumatic input signal into characterized output required for flow ratioing of viscous liquids,



All major components same as used in 90J Series Transcope Recorders

cascade control systems involving flow and a linear variable measurement, and totalizing several measured variables.

Features: Optional interchangeable cams perform wide variety of functions other than linearization. Per-



Can also be use for interface indication. di

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Write now for engineering sheet on Jerguson Magnetic Gages.



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In Canada: Peacock Bros. Ltd.

Check 1236 opposite last page.

CHEMICAL PROCESSING

mits standardization on linear charts, of which wider assortment is available. Linearity aids readability. Unit is reliable square root extractor.

Description: Unit consists of pneumatic servo and set point transmitter. Servo feedback element is precision cam, cut in accord with desired non-linear function. Position of servo-pulley will be function of pneumatic (3-15 psi) input signal to servo sensing capsule. Servo pulley is connected by tape to transmitter which converts pulley position to proportional (3 to 15 psi) output signal.

(Taylor Function Generator is a product of Taylor Instrument Companies, Rochester 1, New York.)

Check 1215 opposite last page.

Reproduces transfer functions of analog computer

Easily adapted to individual requirements of system

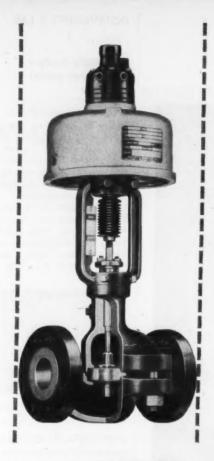
Uses: Control of any electrically-measurable variable, such as electro-hydraulic actuators, especially where large mass positioning in final control element is necessary. Can be used with electrical and pneumatic actuators.

Features: Can fully reproduce transfer functions described by typical analog computer. Unit capable of performing any of three basic control functions: Summation, integration, and derivative.

Description: Each unit consists of controller, servo-amplifier, and power supply, custom assembled to demands of particular system. All units adaptable to any form of startup, operational and shut-down programming, and include a mode-selector switch with settings for "automatic," "automatic balance," "manual balance," and "manual." Each amplifier can be individually balanced.

(Series 800 servo-controller is product of CompuDyne Corporation, 481 South Warminster Rd., Hatboro, Pa.)

Check 1216 opposite last page.





"FIT" Companions

reduce costs . . . increase valving flexibility

With face-to-face dimensions to I.S.A. standards, K&M split body valves are interchangeable with K&M regular globe-body diaphragm valves (and with all standard makes of diaphragm valves).

This exclusive feature of the K&M split body design enables you to make significant reduction in your plant inventory investment of replacement valves. It gives you highly desirable flexibility.

Additional flexibility is provided in the K&M split body valve itself. Interchangeable, unitized construction makes it possible to develop 432 different valve combinations from a single split body.

In a matter of minutes you can make the body reverse or direct-acting; switch the operator to dome, diaphragm, or handwheel; change the seat ring to one of several types; recharacterize by selecting a different plug; substitute the replaceable, rotatable flanges; convert from globe to angle type.

The K&M split body valve fits your existing piping and fits your budget.

One more plus . . . K&M split body valves have the largest C_v offered in split body construction . . . more flow for your money.

Write for Catalog 132 completely describing the valve that brings the split body idea to its fullest development.



S.A. 1597

diaphragm control valves

Our 79th Year



KIELEY & MUELLER, INCORPORATED

Oldest Pressure and Level Control Valve Manufacturer 64 Genung Street, Middletown, New York

Check 1217 opposite last page.

Look into Lonergan Gauges



Look into a Lonergan Maximon Gauge and you'll see the reasons why they are preferred where positive performance, accuracy and long life are required.

First the case. Here's the material to fit your needs—cast iron, cast brass, aluminum, or phenolic plastic. In addition, field conversion of the Maximon gauge to a Saf-T-Kase can be made by purchasing a low-cost Saf-T-Kit.

Look at the Bourdon tube. The precision finish of the alloy, stainless, K-Monel or Beryllium copper means longer life.

Look at the geared rotary movement that gives uniform motion and simplified recalibration. Note the dissimilar metals that reduce wear, preserve tolerance and maintain accuracy to ½ of 1% of the maximum graduation.

Full details on Lonergan Maximon Gauges, for process industries plus utility and industrial gauges and accessories are available in Catalog 1000 G. Write for your copy today to the address shown below.



J. E. LONERGAN CO., 203 RACE STREET PHILADELPHIA 6, PA. SINCE 1872



Check 1218 opposite last page.

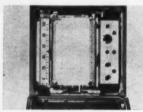
INSTRUMENTS & LAB

Flexibility feature of new lab model recorder

Uses: Measuring such variables as pressure, temperature, motion, flow, density, pH, and electric power.

Features: Special input signal selection switches and span adjustments provide maximum flexibility.

Description: Four-position input selector switch provides for millivolt, volt, microampere, or milliampere input. Five-position span selector offers ranges 0-2, 0-5, 0-10,



Design is for convenience of experimentation

0-25, and 0-50. Alternate span continuously adjustable from 0-2 to 0-50 is available. Adjustable zero and pushbutton standardization are standard. Automatic standardization (desirable for long-duration tests) is optional. Various attachments and accessories are available.

(Laboratory model of dynamater potentiometer recorder is product of The Bristol Company, Waterbury 20, Connecticut.)

Check 1219 opposite last page.

Pressure-reducing regulator features laminar flow

Uses: Controlling back pressure, down-stream pressure; for flow control; as a dump valve, and as manually operated valve.

Features: Laminar flow made possible by straight-through flow design. This eliminates jetting of high speed gas and transient particles into side of regulator, which is said to be frequent problem of conventional regulators. Sound vi-



FEED IT...



SQUEEZE IT...



READ IT...

G-5 Moisture Register for accurate moisture tests in 60 seconds

Fastest moisture test available with accuracy to 0%. Save production and lab time—no skilled labor needed. Use Electronic Moisture Register G-5 anywhere on granular, ground, loose, shredded and powdered materials. Hydraulic pressure assures homogeneous sample. Specially calibrated for ammonium nitrate, ammonium sulphate, toilet soaps, calcium carbonate, sulphur, ammonium perchlorate, sodium bicarbonate, polyethylene resins, many more. Accuracy guaranteed. Ask for free trial.

Write, stating material to be tested, and moisture range, or check No. 1220 on reader service slip.



Moisture Register Co., Dept. CPC P.O. Box 910, Alhambra, Calif.

Check 1220 opposite last page.

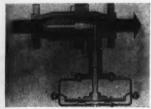
INSTRUMENTS & LAB

bration is said to be reduced by this design.

Hydraulically actuated slave piston is said to regulate flows with fine control and positive shutoff. Unit can be regulated from full flow to bubble-tight shutoff in three seconds.

Description: Expansion type, pneumatic-hydraulic-operated regulator incorporates conventional controls and a diaphragm motor as actuating power source.

Diaphragm plate is connected to master hydraulic piston which operates slave piston within regulator body. Flow through regulator is controlled by compression of solid rubber cylinder by slave



Laminar flow is said to be a principal advantage of new regulating valve

piston acting against movable slotted baffle. Flow is regulated by increasing or decreasing annular area between rubber cylinder and interior regulator body.

(Jet stream regulator is product of Industrial Division, APCO, Division of Textron, Inc., 616 W. Whittier Blvd., Whittier, Calif.)

Check 1221 opposite last page.



"Analysis shows your new formula is two parts epoxy resin, one part vehicle, and one part postnasal drip!"

707 means Jet Travel, but ...

TAYLOR 707T MEANS SIMPLEST, MOST DEPENDABLE FLOW MEASUREMENT

No. 707T Electronic DP Transmitter has no vacuum tubes — no transistors

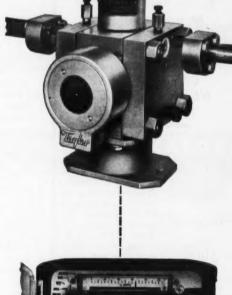
Users of this instrument claim it is the finest flow transmitter ever designed. It provides the widest possible flexibility, sustained long-term accuracy and performance because:

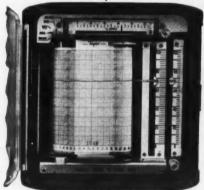
- Simplest Conversion from differential pressure to 0-200mv AC.
- Nothing exposed to the process except end plates (steel or 316 stainless steel) and 316 stainless steel diaphragms.
- Minimum displacement—only .025 of a cubic inch of fluid for 100" range. Permits DP measurement even when solids are present.
- Internal silicone damping—continuously adjustable to damp out pulsations from 5 to 100 cpm.
- Full over-range protection to 1500 psi-either high or low sides.
- Runge span continuously adjustable from 0 to 50" water to 0 to 200" water, using output voltage adjustment.
- External zero adjustment, with wide range of zero suppression:

Compatible No. 700J AC or DC Electronic Recorder

- Powerful serve motor provides accuracy of ½ of 1%, sensitivity to changes of 0.1% in input signal.
- High energy serve motor permits heavy duty, integral alarms.
- Big 4" chart gives continuous 30-day record (1" per hr.). "Adjust-O-Matic" 24-hr. chart tear-off, optional.
- Available with one, two or three pen recording.
- Completely transistorized, unaffected by ± 10 % line voltage variation.

For full information about these outstanding instruments, call your Taylor Field Engineer, or write for Bulletin 98333 (707T) or Bulletin 98335 (700J). Taylor Instrument Companies, Rochester, N. Y., or Toronto, Ont.





Taylor Instruments MEAN ACCURACY FIRST

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PRESSURE **TEMPERATURE**

LIQUID LEVEL

MERCURY SWITCHES

TRANSFORMER-RELAYS

CHECK THESE NEW PRODUCTS BY MERCOID





New SP-DT low pressure (instrument air) control. Small in size, light in weight. Provides any of following operations: SP cut-in high; SP cut-in low; or SP-DT operation. Two operating ranges 1 to 20 and 1 to 30 psig. External adjustments, visible dial and visible circuit position. See catalog No. 860





New low pressure diaphragm control for gases or air. Can be used three ways; for pressure, negative (vac.) pressure or differential pressure. External adjustments. visible dial and visible on-off circuit position. Two operating ranges, 1.0" to 30.0" and 1/2 to 5 psig. See catalog No. 860

ASK FOR CATALOG NO. 860

THE MERCOID CORPORATION 4211Belmont Ave., Chicago 41, III.

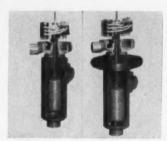
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INSTRUMENTS & LAB

Level controls feature non-metallic wetted parts

PVC is material in contact with liquid

Uses: Controlling levels of liquids that present corrosion or contamination problems in storage or handling. For any liquid of sp gr of 0.70 or above. Chamber and float construc-



Cutaway view of NM-I (left) and NM-2 Magnetrols

tion for service at 100 psi at 70 F, or 50 psi at 140 F.

Features: Immune to galvanic or electrolytic attack. corrosion resistant, immune to oxidizing agents, smooth surface discourages scale or deposits, will not contaminate or impart odors or tastes.

Description: Available in two models; NM-1 external float cage unit with sealed body and float totally enclosed, and NM-2 flanged style chamber unit with head flange secured to chamber by means of gasketed closure. Both units provided with standard 1-in pipe socket connections.

(Model NM-1 and NM-2 magnetrols are product of Magnetrol, Inc., 2110 S. Marshall Blvd., Chicago 23, Ill.)

Check 1224 opposite last page.

NEXT MONTH

The St. Helens Division of Crown Zellerbach at St. Helens, Oregon, was the location of the first continuous completely automatic calcium-hypochlorite system, utilizing oxidation-reduction potential control of reaction. Details on this interesting installation appear in this section next month.

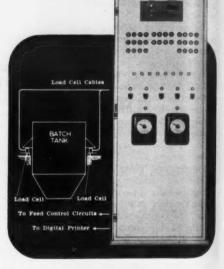
Electronic Batch Weighing System

Automatically Adds Up to 16 Ingredients in Sequence

- Eliminates Manual Setting
- Digital Indicator Reads Net Wt. in Tank at All Times

Gilmore Model 223 Electronic Batch Weighing System is simple and compact . . . eliminates the multiple instruments and manual setting of conventional systems. Pre-set formula automatically programs feed and shut-off at variable set points. Up to 16 ingredients can be added in sequence. Single digital indicator reads total net weight in tank at all times.

For details Write Dept. CP-4



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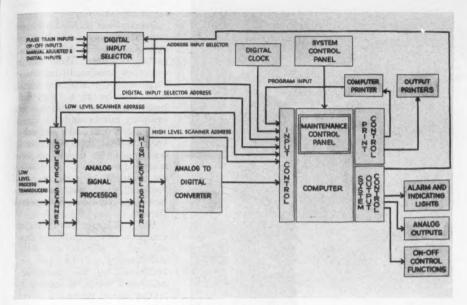
East Coast Sales & Service Office: Box 531 . Media, Pa. . LOwell 6-7228 West Coast Sales & Service Office: 2550 East Foothill . Pasadena, Calif. . Murray 1-8340

Check 1225 opposite last page.



Check 1226 opposite last page.

PROCESS INSTRUMENTATION and LABORATORY APPARATUS



Series 3000 computer control system

Data reduction . . . operating guide calculations . . . program control . . . supervisory computer control . . .

New LN-3000 process control computer intended for on-line functions

Here is the new process control computer representing joint efforts of Philco and Leeds & Northrup, L&N will incorporate it in their digital supervisory control systems, and will be responsible for systems engineering of applications.

The LN-3000 is described as part of a system for process control and data processing. Occupying the floor space of a pair of four-drawer letter files, it is physically one of the smallest process computers available today.

Uses: The LN-3000 has three general "on-line" functions:

1) Data reduction and operating guide calculation. In such "open-loop" service, system receives electrical input signals representing process variables (pressure, temperature, etc.) and solves complex algebraic relationships between these to

produce operating guides. These guides take the form of heat rates, unit or process efficiencies, etc.

2) Program control. Here computer may make complex series of "yes" or "no" decisions, such as related to process start-up or shut-down. These may be used for automatic control or personnel information.

3) Supervisory computer control. Computer calculates settings for analog controllers on basis of known process equations. If these aren't known, computer may be programmed to develop them by performing experiments on process itself.

Features: All solid state construction. Monitors both itself and rest of its system, checking computation errors, equipment failure. For example, if computer develops trouble during use for supervisory computer control, set points of analog control loops remain fixed at last computed



NOW! Swift Sight Glasses With Holes Up To 2" In Diameter

You can now order Swift Sight Glasses with holes from 1/6" to 2" in diameter . . . in nine thicknesses (from 1/6" to 11/4") . . . in any shape . . . and in sizes up to 24" by 60" (limited by size of the Pyrex glass). Standard shapes always available for immediate shipment.*

Swift Glasses are precision-ground from Pyrex Polished Plate Glass . . . they won't cloud or pit . . . resist all chemicals but HF and caustic soda solutions.

*A point to remember: you can take care of all your sight glass needs at one time, with a single order to Swift.

SWIFT Glass Division

SWIFT LUBRICATOR COMPANY, INC.

2 Glass St., Elmira, N.Y.

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HIGH IN PERFORMANCE -All Models Heavy Duty LOW IN COST -Most Popular Model \$55.00 FIRST IN SALES -Since 1957

Underwriters' Laboratories Listed General Purpose and Explosion-proof Models

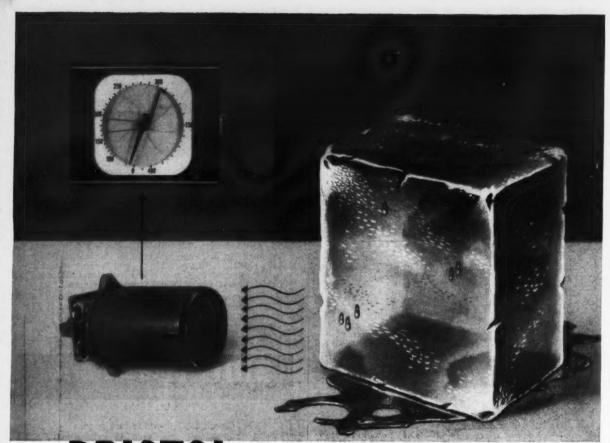
Product of
THE BIN-DICATOR CO.
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IDEAL FOR NO-CONTACT, CONTINUOUS TEMPERATURE MEASUREMENTS ON

Rubber Synthetic rubber Roofing shingles Adhesives Blackened or unpolished aluminum Textiles, synthetic and natural fibres **Plastics** Carpeting Mineral aggregates Chemical flows Petroleum flows Beverage flows Reactor kettles Mill rolls Furnace or oven charges or exteriors Foundry molds

... and many other substances; web processes or products; conveyed, rolled or extruded products; and stationary objects.

0-200° F and other ranges to 1100° F · Direct reading charts, scales in F or C · Calibrated interchangeable head units · Automatic built-in ambient compensation · Easy emissivity compensation

Here's the first radiation pyrometer that really gets down to 0° F.

It's the Bristol Velotron Pyrometer System-so sensitive you can sight the radiation unit (at lower left above) on your hand and get an accurate temperature indication.

And on the high end, spans and ranges are available up to 1100° F or corresponding ranges in degrees Centigrade.

Charts and scales are direct reading, in degrees F or C, even on the lowest ranges. No laborious calibration runs, calculations; no curve consulting needed! And you get famous Bristol Dynamaster* Recorder accuracy -proven in thousands of installations.

Ambient temperature compensation is automatic, completely contained in recorder unit (no third unit needed), and allows use in ambients up

A simple knob adjustment allows compensation for emissivity characteristics of target material from black body on down.

Interconnection cables are standard copper wire; no special, preselected lengths required.

Write for complete technical data on this outstanding new Bristol contribution to industrial pyrometry. The Bristol Company, 141 Bristol Road, Waterbury, Conn. 9.31 *T. M. Reg. U. S. Pat. Off.

... for improved production through measurement and control AUTOMATIC CONTROLLING, RECORDING AND TELEMETERING INSTRUMENTS

Check 1213 opposite last page.

value. In meantime, input equipment continues to monitor process variables for offnormal conditions.

Description: LN-3000 is general-purpose, serial, binary, fixed point, stored-program computer. This means computer handles all information internally as binary numbers, one bit at a time, but both input and output are in ordinary numbers.

Machine can add or subtract in less than 0.001 second; multiply, divide or extract square root in 0.0035; can provide 16 mathematical "orders" which may be modified to provide over 60 operations.

Block diagram shows major components and indicates flow of control signals and data. All primary variables are connected by the computeraddressed low level scanner to analog signal processor which provides input signal suppression, isolation and amplification. High level output from signal processor is sequenced to analog to digital converter by high level scanner. All digital inputs are connected to computer input section by computer-addressed digital input selector.

(LN-3000 process control computer is available from Leeds & Northrup Co., 4901 Stenton Ave., Philadelphia 44, Pennsylvania.)

Check 1230 opposite last page.

Automatic repeater avoids need of replotting

Accessory to PACE 231R analog computer

Uses: Well suited to problems involving simulation of servomechanism, optimization of chemical, petro-chemical and physical systems, solution of boundary-value and eigenvalue problems.

Features: To obtain optimum design in problem with several variables, great many problem runs are needed. These are normally drawn on automatic recorders where speeds are limited by mechanical characteristics of recorders. With repetitive operation, solution appears as continuous plot on 17 inch display screen. Effect of change of problem variables can be immediately observed on screen without necessity of resetting equipment and drawing additional plots. When optimum design is reached, computer may be switched back to real time operation so permanent plots can be made of final and more detailed solution.

Description: Device consists of two parts: Repetitive Operation Control Unit and Display Unit. Pre-patch panel arrangements remain same in either repetitive or real time operation, do not require use of more amplifiers than on real time studies.

(High-speed repetitive operation is available from Electronic Associates, Inc., Long Branch, New Jersey.)

Check 1231 opposite last page.

Highly sensitive temperature control

Uses: Loads up to 10 kw can be controlled directly, for temperature ranges from 25 to 600°F.

Features: Accuracy within 1°F. Pre-aged thermistor probe may be located in platens, air ducts, or immersion wells up to 100 ft from amplifier-relay cabinet, using inexpensive light-gage twisted-lead wire. When sensing temperatures within rotating equipment, thermistor leads are connected via slip-rings.

Description: Unit consists of three pieces: Thermistor probe, sensitive electronic-bridge circuit with relay (using standard vacuum tubes), and control box. If vacuum tube fails, heat cuts off until tube is replaced. Control box may be located up to 30 ft from relay-amplifier. Scales cover dual ranges: 25-225 and 200-600°F.

(Type PC Chromatrol electronic controller is product of Edwin L. Wiegand Co., 7500 Thomas Blvd., Pittsburgh 8, Pennsylvania.)

Check 1232 opposite last page.

HASTINGS VACUUM GAUGES

"PATENTED DIRECTLY-HEATED THERMOPILE TYPE"

Highest Accuracy in Four Ranges-0.2 Micron to 20 mm Hg!

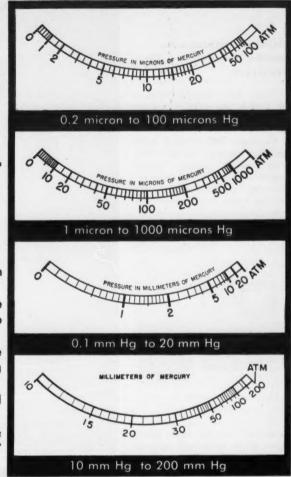
RUGGED! Take shock and vibration greatly in excess of other types of tubes.

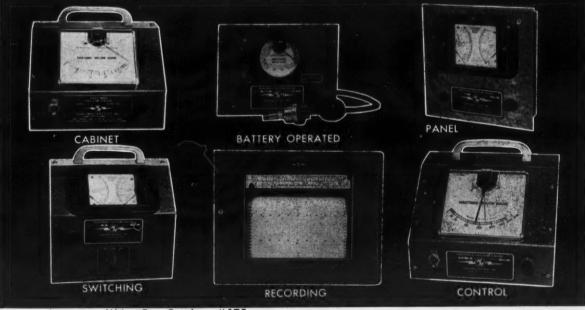
STABLE! Noble metals prevent oxidation — stable calibration can be held indefinitely — no fragile tubes to break or burn out.

CORROSION RESISTANT! Nickel plating and noble metal thermopile assure unusually long life.

EASY TO OPERATE! Dials are direct reading, need no adjustment.

Vacuum Indicators including multi station monitors; also with Relay Control and Vacuum Recorder. For industrial and laboratory applications.





Write For Catalog #175

HASTINGS-RAYDIST, INC. HAMPTON, VIRGINIA

Check 1233 opposite last page.

Fluorine analyzer uses nuclear magnetic resonance

Uses: Can detect fluorine in liquids down to 3 mg in any sample size from 0.2 to 40 cc.

Features: When used with smallest sample, higher field homogeneity permits high-resolution structure analysis. Fluorine peaks chemically shifted more than 9 ppm are cleanly resolved. Integrator accessory enables operators to obtain linear response in



New fluorine analyzer has trim

terms of fluorine mass present. When chemical shift is great enough, each peak in unknown mixture can be separately integrated or, with equal ease, mass of fluorine present can be read out.

Description: Precision is normally 1% of signal, sensitivity is in 500:1 range. Sweep time choices range from 0.5-4 minutes. Sweep amplitude is 0.1 to 20 gauss in 8 settings. Magnet field strength 1750 gauss; higher fields available.

(Model 105 Analyzer is product of Ridgefield Instrumentation Div., Schlumberger Well Surveying Corp., Ridgefield, Conn.)

Check 1235 opposite last page.

Solid-state computer uses plain English

Decoding unnecessary

Uses: Can simultaneously provide data for on-line operation and analysis, off-line analysis, and off-line analysis using on-line data.

Features: Permits analysis of process without interfer-



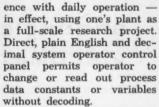


Varec Pulse Code Telemetering Systems and automatic tank gauging equipment are fully described and illustrated in our Bulletin No. CP-3707. For immediate information or qualified engineering consultation, contact any of the Varec branch offices.

On-the-spot engineering and consultation services on Varec telemetering and gauging equipment is now as near as your phone. Through a newly established network of seven Varec branch offices and the strategic locations of new Varec warehouses, immediate delivery and service on all Varec products and parts is now assured. Manned by factory-trained electro-mechanical engineers, Branch offices have direct communication with the Varec home office via Twx and TELEFAX. These new, fully-staffed and fully-stocked branch offices guarantee close contact and service for Varec customers, when and where they need it.

For today's need and tomorrow's, Varec Pulse Code Telemetering Systems, combined with Varec tank gauging equipment, are the fastest and most accurate means of measuring tank liquid level, temperature and volume, and actuating remote equipment. Within five seconds, Varec Pulse Code Telemetering Systems gather information from tanks a hundred feet or hundreds of miles distant for immediate and permanent records and direct readings. No other systems offer the economy, freedom from error, and reliability that Varec provides.

THE VAPOR RECOVERY SYSTEMS COMPANY 2820 North Alameda Street, Compton, California



Description: Programming includes complete machine order code, 4000 index registers and fast arithmetic, such



Compact, office-design units feature all solid-state electronic components

as 2.1 milliseconds for obtaining square root or multiplying. Random access magnetic core memory covers 8000 words. Stored data constants and operating programs can be modified or corrected while machine is running, without disturbing remaining program or stored information. Internally stored program can be automatically modified by external commands from feedback signals, from operator, or from decisions within machine itself.

(ISI 609 information and computer system is a product of Information Systems, Inc., 7350 No. Ridgeway Ave., Skokie, Ill.)

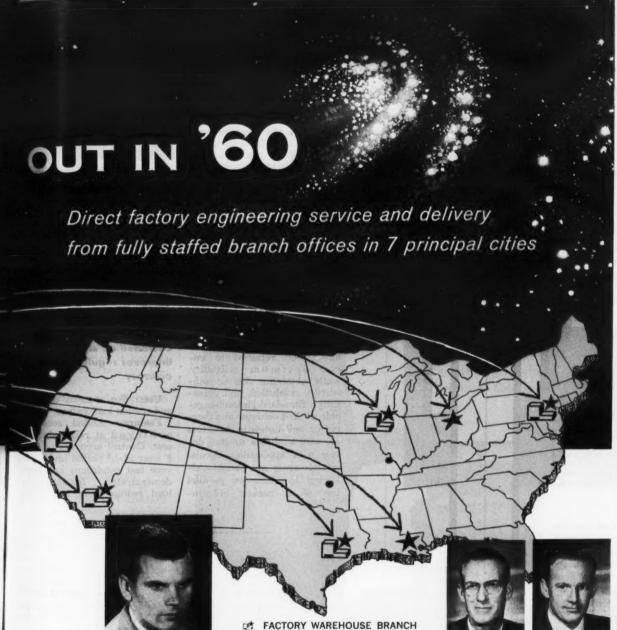
Check 1237 opposite last page.

Electrohydraulic controllers are discussed in 20-page booklet which summarizes basic principles and potential applications of electrohydraulic servocontrol mechanisms. Bul 110 — MOOG Servocontrols, Inc.

Check 1238 opposite last page.

Soil testing equipment, ranging from pocket-sized penetrometer to completely equipped mobile laboratories, is described in 316-page catalog. Containing more than 1500 illustrations, manual is referenced to ASTM specifications. Cat 1960 — Soiltest, Inc.

Check 1239 opposite last page.



Ray V. Long Exec. Vice President Compton, California

Keith A. Browning

Reg. Mgr., Midwest

Chicago, Illinois

Ben C. Wride District Manager Chicago, Illinois



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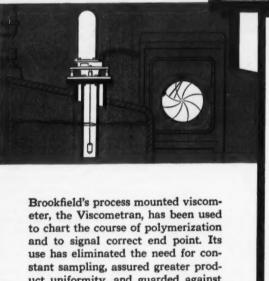
Check 1456 opposite last page.

POLYMERIZATION NEWS!

BROOKFIELD VISCOMETRAN

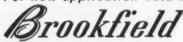
Now used successfully for end point determination and continuous "in-process" viscosity recording.

Successful "in-process" viscosity measurements have been reported for polystyrene, polyvinyl acetate, polyurethane resins, and urea-formaldehyde resins.



eter, the Viscometran, has been used to chart the course of polymerization and to signal correct end point. Its use has eliminated the need for constant sampling, assured greater product uniformity, and guarded against run-away reactions. Its service in applications having pressures from vacuum to 100 psi where gas purging is possible has been remarkably trouble free and dependable. Unaffected by variations in liquid level, and easy to clean, the Viscometran continuously and accurately senses viscosity — a variable that can very well be fundamental in your process.

For new application data sheet write or wire:



the world's standard for viscosity measurement

ENGINEERING LABORATORIES INCORPORATED STOUGHTON 34, MASSACHUSETTS

Check 1241 opposite last page.

INSTRUMENTS & LAB

Gas chromatography extended by new instrument

Based on high-sensitive technique

Uses: To meet requirements of longer and higher temperature analyses made possible by new detector-column combinations.

Features: Most significant development in new Vapor Fractometer is realization of the possibilities of the Golay capillary column by the flame and betaray ionization detectors. These new high performance detectors permit accurate measurement of sample components in minute quantities resolved by the Golay column.

Description: Proven design elements of the P-E 154 Series have been retained to ensure optimum reliability, while obtaining desired sensitivity, resolution, and versatility. Standard interchangeable packed columns and thermistor and hot-wire detectors are also available to give device wide application. Special arrangements are possible allowing simultaneous parallel use of a packed column-



Minute quantities of sample are handled with high accuracy

thermistor detector unit with a Golay column-ionization detector to further extend versatility.

(Model 154-D vapor fractometer is a product of Perkin-Elmer Corp., Norwalk, Conn.) Check 1242 opposite last page.

Cascaded air signal improves regulator accuracy

Uses: For systems of wide and sudden load swings.

Features: Added accuracy a chieved at relatively low cost. Control accuracy of 6-8' F over 24-hr period under severe test conditions has been demonstrated. Instantaneous load swings from 210 to 80



"He's stirring it for me. What do you think he's doing in there?"

gpm water flow have been easily handled while controlling temperature to within ±5° of set point. Need for pressure-reducing valve ahead of diaphragm-motor valve in control systems is eliminated by cascaded air system which loads pilot.

Description: Immediate response to demand changes is made possible by pressure regulating action of externally-piloted main valve, and by bimetal temperature-sensing element. Temperature pilot continuously regulates loading air pressure. When loading signal from this is applied to pressure pilot to reflect process temperatures, it causes repositioning of main valve. Air economy is such that temperature pilot can be fed through up to 12 ft of 1/8 in capillary tubing.

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(Type EAT40 air-control temperature regulator is product of Spence Engineering Co., Inc., Walden, N. Y.)

Check 1243 opposite last page.

Round chart recorder features accuracy

Uses: Process control.

Features: Accuracies of ± ½ percent. Most of recorder's components interchangeable with those of G-E strip-chart models. Minimum accurate scale span 1 millivolt DC. Response times are 4, 10, and 24 seconds full scale. Zener diode eliminates need for dry cell or standard cell power supply, offers voltage reference accurate to ±0.05 percent. Temperature coefficient is 0.001% / C. Chart speeds are 1, 8, 12, or 24 hours, or 7 days.

Description: Null-balance potentiometer-type design recorder. Control portion features individually adjustable trip switch cams; single cam is reset without upsetting others. Hinged face aids maintenance. Printed circuit boards and plug-in components included to speed service time.

(Round chart recorder-controller product of General Electric Co., Schenectady 5, New York.)

Check 1244 opposite last page.

Tune up furnaces with dashboard simplicity Using a Bailey HEAT PROVER Analyzer



Chemical and petroleum division

BAILEY METER COMPANY

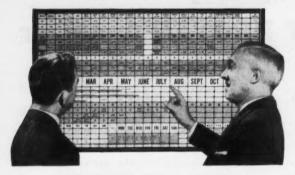
1074 IVANHOE ROAD . CLEVELAND 10, OHIO

In Canada—Bailey Meter Company Limited, Montreal



Check 1240 opposite last page.

You Get Things Done Better By Seeing What's Happening



BOARDMASTER VISUAL CONTROL

- Production, School-

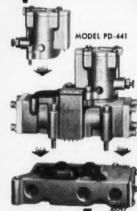
Complete Price 549

FREE

24-Page ILLUSTRATED BOOKLET AA-10 Without Obligation

GRAPHIC SYSTEMS, Yanceyville, North Carolina

Check 1246 opposite last page.



4-way single or double pilot-operated types, for sub-base or manifold mounting. Aluminum and stainless steel components asand stainless steel components as-sure multi-million cycle dependa-bility...short-stroke design speeds response. Interchangeable pilots, with coils guaranteed against burn-out for life of valve, fit any plug-in Speed King. Separate coded (4-wire) circuits on double soleoptional manual over-ride, common or separate exhaust ports, sub-base connected external pilot appropriate the common of separate exhaust ports, sub-base connected external pilot appropriate the common of the common of separate exhaust ports, sub-base connected external pilot appropriate the common of the com supply . . . ¾ in. exhaust port, ½ or ¾ in. inlet and cylinder ports . . . flow area through valve and sub-base equals full ½ in. pipe . . . valve meets JIC standards.

For more information, write for Bulletin SPL. Address Dept. CP-460, Valvair Corp., Akron 11, Ohio.

INDUSTRIAL DIVISIONS of IBEC: The Sinclair-Collins Valve Co. The Bellows Co., Akron, Ohio . V. D. Anderson Co., Cleveland, Ohio.

Check 1247 opposite last page.

INSTRUMENTS & LAB

Dial indicator features economy, versatility

Uses: Where process variable indication only is needed.

Features: Indicator can be replaced, in less than one minute, with strip chart or recorder interchangeable units. Adaptability emphasized by following multiple options which may be added, such as: Indication of second variable on separate dial; control point detection for truly bumpless manual-to-automatic transfer: one or two integrally mounted. electric or pneumatic highlow alarms for each variable indicated; cascade switch for



Interchangeable with all other Taylor Transcope units.

pneumatic set control, selfcontained, no subpanel neces-

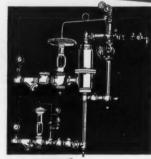
Description: Input signal is amplified by force balance servo motor, producing positioning force 150 times conventional. Set point transmitter uses knob to position range spring and red set pointer. Through powerful booster relay, pointer position is converted to proportionate air pressure.

(90K Series Transcope® pneumatic dial indicators are products of Taylor Instrument Companies, 95 Ames St., Rochester 1, N.Y.)

Check 1248 opposite last page.

Metering pumps, designed to solve pump-problems involving hard-tohandle chemicals or applications requiring accurate metering, are discussed in detail in Cat 59 Process Equipment Division, Lapp Insulator Company, Inc.

Check 1249 opposite last page.



FREE BULLETIN

Shows how

Pick Heaters

are used in

many

industries.

AM INJECTION HOT WATER **HEATERS**

8 sizes . . . 500 to 50.000 Gals. Per Hour

Hot water in a flash - produced only as it's needed!

Pick patented mixing chamber is completely automatic . . . direct contact of steam and water provides desired hot water temperature instantaneously...tem-perature accurately maintained by thermostatic controls.

Water volume adjustable from 5% to full rated capacity of heater. 20-second reaction to desired up-and-down changes in water temperature.

Write today to Dept. G

Check 1250 opposite last page.

The Problem of Oil Vapor

... and how to solve it!

Chemical and pharmaceutical manufacturers, petroleum refiners, food processors and users of pneumatic instrumentation . . . all encounter critical procedures wherein hydrocarbon vapor in compressed air and process gas streams produces adverse results.

Typical Vape-Sorber uses include:

- · Aeration and agitation of liquids
- · Air-cleaning of containers
- Protection of desiccants for dehydration

The Selas Vape-Sorber, effectively combining principles of liquid-gas separation and high capacity oil adsorption, completely removes hydrocarbon vapors, dirt and liquid-phase entrainment of every kind. Its compact, welded steel construction contains no moving parts, requires minimum maintenance.

Send for your free copy of Vape-Sorber booklet No. 104. It describes, by chart and table, the exact size and model for your requirements.

VAPE) SORBER

Vape-Sorber is a regis-

tered trade name of Selas Corporation of

OF AMERICA PENNSYLVANIA



Check 1251 opposite last page.

8100

NEW LITERATURE
Process Instrumentation
and Laboratory Apparatus

Precision instruments for measuring, indicating, recording and controlling rate of flow of all types of fluids are subject of Bul M-1—Instrument Division, Schutte and Koerting Company.

Check 1252 opposite last page.

Balances, including 39 different models for analytical, general purpose and precision applications, are subject of eight-page Mettler Reference Guide — Will Corporation.

Check 1253 opposite last page.

UP

Resistor wire of modified 80-20 nickel-chromium 800-ohm alloy for precision wire-wound resistors and potentiometers is detailed in Bul 111 — Hoskins Manufacturing Co.

Check 1254 opposite last page.

High-speed centrifuges are subject of 16-page booklet which features 13 improved models. Cat 159— Lourdes Instrument Corporation, division of Labline, Inc.

Check 1255 opposite last page.

Data collecting system which automatically channels information from numerous work stations to central processing point is subject of illustrated 20-page Collectadata Bul — Friden, Inc.

Check 1256 opposite last page.

All-glass stopcocks which are interchangeable are illustrated and described in Kern-Exelo Bul — Kern Laboratory Supply Company.

Check 1257 opposite last page.

Actuators and controllers for remote, automatic or punch card control of positioning and programming are presented in 16-page Bul J-105 — Jordan Controls, Inc.

Check 1258 opposite last page.

Labware and industrial ware, fabricated of pure fused quartz and silica, are cataloged in 30-page Vitreosil Cat — Thermal American Fused Quartz Company.

Check 1259 opposite last page.

Strip-chart recorder and materialprocessing applications related to the paper, rubber, textile and other industries are described in Bul GET-2741-3A — Instrument Depathy, General Electric Com-

Check 1260 opposite last page.



Foxboro eliminates the amplifier from pH recording and control

cuts the drift, cuts the cost, cuts the maintenance, too!



Foxboro pH Dynalog Controller — for use where it is desired to hold pH at a predetermined valve.



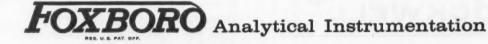
Foxboro pH Dynalog Indicator — for use where complete record of pH value is not required.

THAT'S RIGHT — the intermediate amplifier is gone from Foxboro's new low-cost system for measuring pH. And gone with it is the wasted panel space, the drift, the daily standardization inherent with earlier systems.

In the new Foxboro system, the signal from the pH electrode goes direct to a high impedance Dynalog* receiver — without intermediate amplification. Signal operates a direct-reading indicator or recorder—or a controller and alarms, when desired.

The new Foxboro pH system is the simplest, most economical method of measuring pH available today. Ask your Foxboro Field Engineer to tell you about it. Or write for data sheet. The Foxboro Company, 815 Norfolk Street, Foxboro, Massachusetts.

*Reg.U.S.Pat.Off.



Check 1261 opposite last page.



SAVE YOUR VALVE DOLLARS

Specify From The Only Complete Line Of Lubricated Plug Valves

You'll save valve dollars in two important ways by specifying Rockwell-Nordstrom lubricated plug valves: 1. Lubrication stops wear, assures long life at lower cost. 2. They're lubricant sealed for positive shut-off; prevent costly loss or contamination. And, Rockwell-Nordstrom is the world's only complete line of lubricated plug valves with sizes, pressures and special operating accessories to give you the exact valve to fill your needs.

Get Free Literature or have a Rockwell Field Engineer call by writing: Rockwell Manufacturing Co., Pittsburgh 8, Pa. Canadian Valve Licensee: Peacock Brothers Limited.

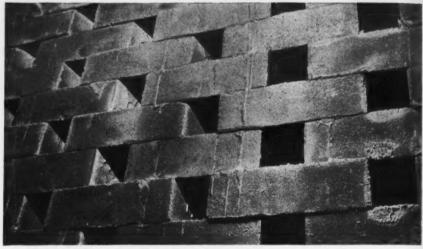
ROCKWELL-Nordstrom VALVES

another fine product by



Check 1262 opposite last page.

CP CORROSION



Checkerboard formation of firebrick on baffle wall mixes sulfur and air for complete

Providing largest saving in maintaining continuity of operation at sulfite paper mill —

High-alumina firebrick lasts three times as long

PROBLEM: Firebrick formerly used for baffle walls at a large sulfite papermill in The Northwest failed in one to two years, causing shutdowns that were costly in cases where another unit was not available. Brick was used in the baffle section of sulfur combustion burners. These are checkerboard formations that mix air and sulfur vapor for complete combustion. Temperature is 2200°F.

Solution: Several years ago plant started using Korundal firebrick for baffle section and around inlet where temperatures are highest. This type of firebrick contains 90% alumina. It is suitable for temperatures to 3500°F. Five combustion chambers now utilize the alumina firebrick.

Results: Korundal firebrick has lasted at least three times as long as previously used brick. It has been in service up to a maximum of five years. Greatest saving achieved with it is in continuity of operation.

(Korundal firebrick is product of Harbison-Walker Refractories Company, 307 Fifth Ave., Pittsburgh 22, Pa.)

Check 1263 opposite last page.

GORDON WEYERMULLER, Associate Editor



Operator checks one of sulfur burners at papermill

Plastic pipe reinforced with asbestos resists temperatures to 300°F

Features corrosion resistance, high strength

Reinforced plastic pipe is made with either epoxy or phenolic resins containing asbestos fibers uniformly distributed in pipe. Asbestos content approaches 50% and gives high-strength characteristics to pipe. Thermosetting resin contributes excellent chemical resistance and heat stability.

Pipe is suitable for temperatures to 300°F or slightly higher. Tests run with 60 psi live steam at 307°F showed no effect on pipe or joint after 16 months.

In general, the pipe is suitable for alkali-solvent-mild acid service. Standard IPS threads are provided. It is easy to thread, cut and groove pipe in field. Pipe will soon be available in 10' lengths in diameters of 1 through 6".

(Asbestos-reinforced plastic pipe is development of Johns-Manville Corporation, 22 East 40th Street, New York 16, New York.)

Check 1264 opposite last page.

Tantalum tubing made in lengths of up to 60'

Availability of seamless tantalum tubing in lengths of up to 60' is expected to increase its uses in the chemical processing industries in heat exchangers and acid concentration equipment.

Tantalum tube is made by extruding a solid piece of metal through a die. The metal is one of the most corrosion-resistant materials known, being virtually unaffected by acids of all kinds.

(Tantalum tube is product of Wolverine Tube Div., Calumet & Hecla, Inc., 17200 Southfield Rd., Allen Park, Michigan.)

Check 1265 opposite last page.

A new concept in the coating field

GACOTE NA-62



WHAT IT IS:

Gacote NA-62 is an economical combination neoprene asphaltic coating

WHERE IT IS USED:

Underground pipe Underground tanks Pipe and tank exteriors Structural steel Undercoating for resistance to weathering, moisture and mild chemical service where costly coatings are not justified.

Lining water tanks (non potable water)
Moisture barrier
Damp surfaces
Sealing old roof structure
Wooden box car roofs

OUTSTANDING CHARACTERISTICS:

No primer required
Easily applied to damp surfaces
Remains flexible
Will not crack in cold temperatures

Good weathering resistance Good moisture resistance Minimum surface preparation

For further information, write. We'll forward literature of interest.

GACOTE
NEOPRENE*
HYPALON*
VINYL
EPOXY
URETHANE

SHEET AND LIQUID

GATES ENGINEERING COMPANY, WILMINGTON 99, DELAWARE

Check 1266 opposite last page.



Check 1267 opposite last page.

BEDFORD, OHIO

REINFORCED INERT PLASTIC

J&H TANKS

FOR ALL CORROSIVES

AND DISTILLED WATER STORAGE

Better than stainless at half the cost!

VISIBLE LEVEL

UNFAILING INVENTORY & BATCHING GAUGE

- √ Standard 110 to 4,000 gal. sizes mass produced for immediate delivery
- √ Horizontal or vertical
- √ Round or special shapes
- ✓ Excellent translucency
 ✓ One-piece, leakproof
- ✓ One-piece, leakproof
 ✓ Sanitary, glass-smooth
- √ Non-contaminating
- √ Fully guaranteed

Used by 100 largest chemical, drug, food, tanning, paper, textile plants. Any size or special shape available; select from many standard models and save money. Outlet sizes and locations to order. Write for bulletin giving sizes, specs and prices.

JONES & HUNT INC. 102 Emerson Ave., Gloucester, Mass.

Check 1268 opposite last page.

Foote Bros. Drives in the CHEMICAL PROCESS INDUSTRY

Puts 60 Tons
of Plant Food
Through the Wringer
Every Hour —

NEVER MISSES A TURN!







Driving a giant concurrent dryer, 50 feet long and 7 feet in diameter, with a capacity of 60 tons of plant food per hour takes a reducer with plenty of stamina.

Add the fact that the reducer must withstand heavy shock loads and continuous 24-hour-a-day operation during peak production periods, and you've got a problem.

Yet—the Foote Bros. LINE-O-POWER Reducer used to rotate this unit was installed more

than two years ago and has never been shut down for maintenance.

Dependable, trouble-free performance of Foote Bros. Drives in the chemical process industry is no accident. One of many things you can count on when you specify or install a Foote Bros. Drive is rugged, stand-up-and-take-it stamina. We build them that way.

There's a Foote Bros. unit available to meet your drive requirements. Ask your nearby Authorized Foote Bros. Distributor to recommend the right unit for your requirements. Write for LINE-O-POWER Engineering Manual LP-3.

FOOTE BROS.



GEAR AND MACHINE CORPORATION

4553 South Western Boulevard, Chicago 9, Illinois

POWER TRANSMISSION DRIVES

Check 1269 opposite last page.

CORROSION CONTROL

Accurately proportions corrosive chemicals

Uses: For chemical and airconditioning fields and for other applications.

Features: Unit will effectively meter such materials as sulfuric acid, sodium hydroxide, phosphoric acid and hydrofluorosilicic acid.

Description: Positive - displacement pump, made of corrosion-resistant materials, can be easily installed on



Complete package consists of proportioning pump, foot valve, injection nozzle and connecting hoses

floor, shelf or wall. It takes suction directly from shipping container. Capacity is up to 0.7 gph, with discharge pressure to 100 psig.

Complete package consists of pump, foot valve, injection nozzle and connecting hoses. (Chem-O-Feeder is product of B-I-F Industries, Inc., 345 Harris Ave., Providence 1, Rhode Island.)

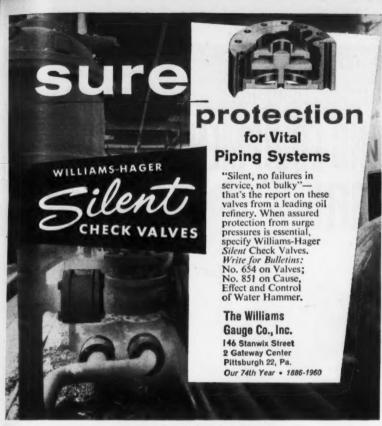
Check 1270 opposite last page.

Polypropylene pumps handle corrosives at 300°F

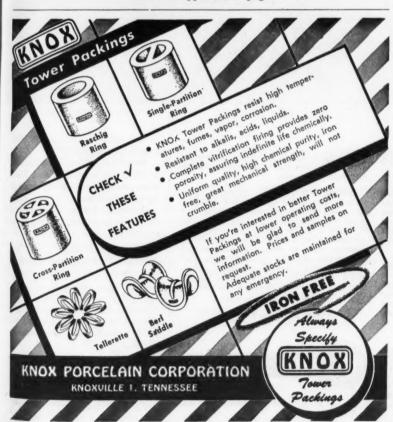
Uses: For handling solvents, greases, oils and many common acids and chemicals.

Features: Pumps are suitable for solution temperatures up to 300°F.

Description: Available in two sizes, centrifugal pumps offer a capacity range from two to eighty gpm. Polypropylene casing is enclosed in cast iron frame for added



Check 1271 opposite last page.



Check 1272 opposite last page.

CORROSION CONTROL



Polypropylene pump is equipped with mechanical shaft seal

support. Mechanical shaft seals are used.

Pumped fluid contacts only facings of rotating and stationary rings, which can be provided in Teflon, carbon, ceramic or Stellite materials. Low-friction, widely spaced bearings are used in bearing pedestal to give quiet operation and reduce loading.

(Models ZP-25 and ZP-35 polypropylene pumps are product of Vanton Pump & Equipment Corporation, Hillside, N.J.)

Check 1273 opposite last page.

Large tantalum sheets cut cost of metal for tanks

Production of large sheets of tantalum — 36" wide by 72" long — will reduce labor costs for vessels utilizing metal and lessen possibility of



contamination. This is made possible by elimination of up to 50% of required welding with the larger sheets.

Sheets are 0.020" thick and weigh about 32 lb each. Price is \$59.16 per lb.

(Tantalum sheets are product of Kawecki Chemical Company, Boyertown, Pa.)

Check 1274 opposite last page.



Dore -

FLUOROGREEN® COMPRESSOR RINGS

Require No Lubrication Give Ten Times Longer Service

Elimination of costly lubrication and ten times longer service means substantially increased performance; and greatly decreased maintenance and replacement costs when you install Dore' Fluorogreen Compressor Rings in reciprocating pumps and gas compressors.

Fluorogreen rings have the low coefficient of friction of virgin Teflon*; iron-like wearing characteristics and extraordinary resistance to chemicals, moisture and temperatures to 500 deg. F. Their strength and flexibility are excellent.

Many compressors, now in lubricated service, can be switched to non-lubricated service by the use of Dore' Fluorogreen Rings. They are available in two types: one-piece tension rings and three-piece segmental rings for grooved pistons.

For complete specifications and properties write for Bulletin L-58.

Fluorogreen is John L. Dore' Company's registered trademark for their filled Teflon.

Registered trademark for DuPont fluorocarbon resins.



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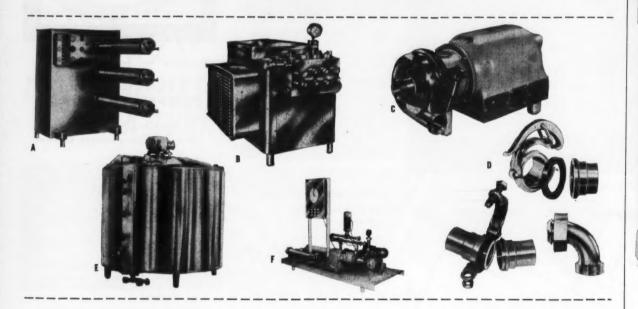
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ge.

for heating, cooling, combining, homogenizing, storing and pumping of fine chemicals, cosmetics, pharmaceuticals, biologicals

PROFIT ENGINEERED PROCESSING EQUIPMENT FROM CHERRY-BURRELL



A-THERMUTATOR HEAT EXCHANGERS. Heats to 350° F., cools to minus 50° F. Available with one, two or three tubes. Combinations of heating and cooling tubes for specific applications. All product contact surfaces stainless steel. Choice of heating or cooling mediums. Heat with steam or hot water — cool with water, freon, brine, ammonia, dowtherm. Write for Bulletin G-572.

B-HOMOGENIZERS. New, all stainless steel models. Single- and two-stage homogenizing valves. Plugs and seats of noncorrosive solid Stellite. Perforated, replaceable valve caps take 98% of valve wear. High-speed shearing action, steady pumping pressure assure complete particle dispersion, prevent globule separation back to pre-homogenized state. Available in 11 models. Capacities from 50 to 6000 gallons per hour.

C-"FLEXFLO" SANITARY CENTRIFUGAL PUMPS. Type 316 stainless steel. Four models with ¼ through 30 h.p., capacities from 2000 to 210,000 pounds per hour. Entire product end of pump quickly and easily taken apart for cleaning without tools. New hinged clamp ring for protection against distortion through abusive use — assures continued perfect alignment. New design shaft for "O"-ring impeller locking. New balanced rotary seal. Involute design. "Flexflo" design allows setting the outlet in any position. "Flexflo" centrifugal pumps also available in industrial unpolished models. Write for Bulletin G-567.

D-FITTINGS, VALVES AND STAINLESS STEEL TUBING. A complete line of fittings and valves for cleaned-in-place or take-down lines. All stainless steel. Flexlok tygon hose connections for connecting tygon hose to sanitary fittings. Stainless steel tubing in 1" through 4" sizes. Polished to 180 grit. Write for Bulletin G-559.

E-LAB MODEL PROCESSING VATS. 45-gallon capacity. Sidewall heating and cooling surface for wide range of temperatures. Four variable-speed agitators. Vat may be operated at atmospheric pressures or sealed for vacuum or pressure operations. Designed for laboratory product

testing to determine process techniques and production machine design. Write for Bulletin G-545.

F-THERMINJECTOR. A new, flexible, completely automatic system for heating and cooking of pumpable products and mixtures. Reduces cooking time to minutes. Enables you to pump product—and cook it—on a continuous, steady rate to the Therminjector's maximum capacity of 3,000 lbs. per hour. Closed circuit operation eliminates possibility of contamination or incorporation of foreign materials. Write for Bulletin G-583.

Address your inquiries to:

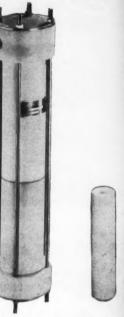


CORROSION CONTROL

CuSO₄ sol at 220°F handled by filter made of Teflon

Problem: A large company on the West Coast sought a means of filtering copper sulfate solution at 220°F at a flow rate of 5 gpm.

A plastic material was desirable for construction of filter to avoid plating out of solution. However, plastic had



Teflon filter uses filter tubes of Orlon wound on Teflon core

to be able to withstand the temperature of 220°F.

Solution: A filter constructed of 100% Teflon was made. Two filter tubes are Orlon wound on a Teflon core.

Results: Filter has satisfactorily handled the solution at 220°F.

(Teflon filter was made by Filterite Corporation, Timonium, Md.)

Check 1277 opposite last page.

(Teflon for filter was furnished by John L. Doré Co., 5406 Schuler St., Houston 7, Texas.)

Check 1278 opposite last page.

For more information on product at right, specify 1279 . . . see information request blank opposite last page.

Check 1276 opposite last page.



Kimax Tempered Glass Pipe never affects your product.

Made rugged for amazing resistance

One of the many benefits of Kimax Tempered Glass Pipe is its ruggedness. Selective tempering and one-piece construction give an unusual degree of mechanical strength and resistance to normal abuse.

Yet this pipe is light in weight for easy handling and installation.

It has amazing heat resistance operating in temperatures up to 450°F. It shrugs off heat shock to permit quick transition from hot to

cool flow, speeding cleaning and reducing down time.

Smooth inner walls of Kimax Tempered Glass Pipe prevent scaling and corrosion. Since glass is inert, nothing is added or taken from the products flowing through this pipe . . . total assurance of constant product purity.

Transparency permits a rapid, visual check for stoppages. When clogging occurs, cleaning is quickly

and easily done since every joint is easily disassembled.

Light-weight, durable, and economical Kimax Tempered Glass Pipe is available with complete fittings and accessories for every piping requirement, and is interchangeable with other piping.

For your free copy of the current catalog, write to Kimble Glass Company, subsidiary of Owens-Illinois, Toledo 1, Ohio.

Nationally distributed by Fischer & Porter Company, Warminster, Pa.

KIMAX TEMPERED GLASS PIPE
AN (1) PRODUCT

Owens-Illinois

GENERAL OFFICES . TOLEDO 1, OHIO

PUMPAGE

Goulds news about pumps for process industries



Glassed pump keeps tattletale gray out of light bulbs

Sylvania Electric Products Co. uses an abrasive slurry of hard fine phosphor particles in a xylol solution to coat the inside of its fluorescent tubes.

This slurry has always been hard to handle. It quickly eroded metal pumps which then contaminated and discolored the slurry. Discoloration increased rejects. A pneumatic system was tried . . . it needed constant monitoring and created a vapor hazard.

Sylvania engineers installed a Goulds-Pfaudler test pump, estimating a nine-month life would pay for the pump. Over two years later, the pump shows no wear or foreseeable future problems.

Sylvania now has four Goulds-Pfaudler glassed pumps, each running about 80 hours per week and handling 30 gpm of slurry against a 30-ft. head.

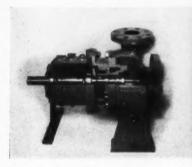
This simple, completely enclosed system ends vapor hazard, involved pipes and controls, and the need for constant monitoring. The inert glass protects product purity.

The ductile iron difference

To make ductile iron, magnesium is added to molten cast iron, changing the sharp, thin graphite flakes to spheroids. The spheroids have large areas of iron matrix between them, and since they have no sharp edges, the ductile iron has far greater strength than the original cast iron.

Ductile iron is so tough it can be used in many applications previously requiring cast steel.

It might pay you to look into this. Write us for information on ductile iron pumps or parts.

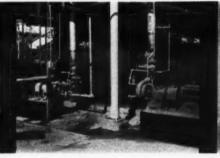


Pump with cold feet

The Goulds Model 3775, available in steel and any of the stainlesses, handles temperatures to 600° F because of its cooled support, bearing and seal chamber construction.

It is ideal for handling flammable or otherwise dangerous liquids, withstands thermal shock.

For information on this, or other products on this page, write Goulds Pumps, Inc., Dept. CP-40, Seneca Falls, N. Y.

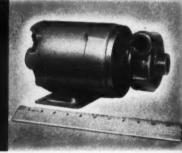


Vicious viscous kept moving

Over 100 Goulds pumps do a wide variety of pumping jobs at Marathon Southern Corporation.

Among them are two tough 3715's. These keep abrasive, viscous black liquor moving. Each handles 200 gpm to a head of 65 ft. Stainless steel 316 construction resists the bite of hot, abrasive liquor.

Choose construction materials best suited for you when you get the Model 3715. Write for Bulletin 725.4 which lists available materials.



Now...circulate with Hastelloy "C"

If you need a small pump in a hurry to circulate or transfer clear corrosives—we can supply it right off the shelf.

Hastelloy* "C," a highly corrosionresistant nickel-chrome-molybdenum alloy, is now available on our Model 3604. This 34" centrifugal pump with big-pump stamina is built for 'roundthe-clock service in chemical process work, pilot plant or laboratory.

Drop us a line and we will send you a bulletin with performance chart and other information.

*Trademark of the Haynes-Stellite Division of Union Carbide Corp.



Check 1280 opposite last page.

When water or oil in gases cannot be tolerated . . .

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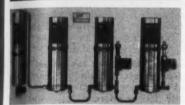
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INSTALL ROBBINS

dehydration equipment

Robbins Aviation offers you both disposable cartridge type and refrigeration type dehydration systems for practically all types of gases ... equipment designed and built to rigid quality control standards to give you maximum satisfaction in efficient trouble-free performance.

Robbins equipment is used extensively for aircraft pneumatic systems, test laboratory equipment, mobile compressor trailers, hydraulic system purging, missile charging and pressurizing systems, for instrument, laboratory, and factory air, controlled atmospheres for brazing and heat-treating furnaces, etc. Mechanical filters, drier and purifier chambers, refillable and disposable cartridges, dewpoint indicators also available.

Fast, positive, economical removal of water or oil vapor and impurities

Pressures to			12	,000)	12
Safety Factor						
Dewpoints to				-1	00	۰F

. as low as 0.3 ppm/w



Manufacturers of high quality valves and dehydration equipment

2350 E. 38th St., Los Angeles 58, Calif. LUdlow 9-5221

Check 1281 opposite last page.

CORROSION CONTROL

PVC pipe tape can be applied at -5°F.

Uses: For protecting pipe, joints, tees, couplings and other irregular shapes.

Features: Tape can be applied at temperatures as low as -5° F

Description: Polyvinyl chloride pressure-sensitive tape has high insulation resistance and electric strength. It resists action of acids, alkalis, salts, oil and fungi or mold.

(PVC tape is product of Minnesota Mining and Mfg. Co., Dept. WO-11, 900 Bush Ave., St. Paul 6, Minn.)

Check 1282 opposite last page.

Safety relief valve resists all acids except HF

Hot, concentrated caustic also withstood by unit

Uses: For pressure relief, vacuum relief and conditions where inlet port is subject to both vacuum and pressure. It



Teflon and Pyrex-brand glass is used in construction of safety relief valve

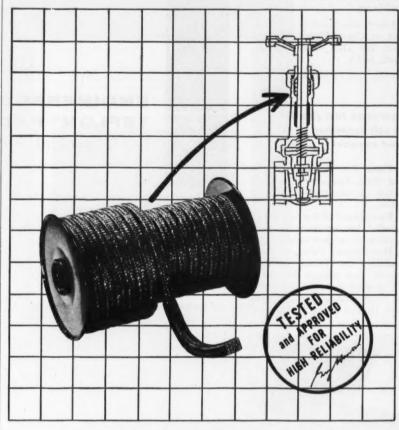
is suitable for controlling pressure in reactors, vessels and pipelines in 5 to 35 psi

Features: Valve is resistant to all acids except hydrofluoric and to hot concentrated

Description: Pyrex-brand glass and Teflon used in construction of valve provide visibility and corrosion resist-

R/M CAPABILITY

develops Teflon* filament packing for all types of chemical processing equipment



An example of R/M capability in the chemical industry is the development of packings made of braided Teflon yarn and materials of various types in combination with Teflon, R/M Nos. 847 and 848 are good examples. They are constructed of cross-locked braided Teflon filaments. R/M 847 impregnated with Teflon suspensoid is recommended for use on valves. R/M No. 848 is impregnated with special lubricant for dynamic service and may be used on valves but is generally recommended for pumps (shaft and rod).

Both types have superior chemical resistance—are ideal for equipment handling solvents, dilute and concentrated acids, alkalis and slurries. Both will function effectively at temperatures up to 500°F.

R/M engineers have amassed a wealth of experience in manufacturing packing and gasket materials for the chemical industry. Let them solve your packing problems. Why not outline your particular requirements and send them to us.

*Du Pont trademark for its TFE-fluorocarbon resin



PACKING DIVISION, PASSAIC, N. J. MECHANICAL PACKINGS AND GASKET MATERIALS

Check 1283 opposite last page.

CORROSION CONTROL

ance. Top works and spring components were sealed from fluids handled. Design provides a constant seal of seat to plunger with sealing pressure increasing as inlet pressure builds up.

(Safety relief valve is product of Chem Flow Corporation, 108 Dell Glen Avenue, Lodi, N.J.)

Check 1284 opposite last page.

Corrosion test cabinet is self-contained and compact

Uses: For conducting saltfog tests, humidity tests and other accelerated corrosion tests.

Features: Everything needed for standard tests is built into compact cabinet.

Description: Cabinet is essentially two rectangular steel boxes, one within the other. Inner shell or testing chamber is lined with vulcanized rubber. Hinged cover is also rub-



Cabinet makes corrosion testing easier

ber lined. Insulation on outer shell confines heat to test chamber. Provision is also made for sealing cover.

Crossbars are provided to suspend samples. Controls are grouped for convenience. Variety of optional equipment can be furnished.

(Corrosion test cabinet is product of Industrial Filter & Pump Mfg. Co., 5900 West Ogden Ave., Cicero 50, Ill.)

Check 1285 opposite last page.



TEFLON* PRODUCTS for Chemical Processing

Processors find it good practice to app Garlock Teflon Packings and See against hot, reactive chemicals.

Garlock LATTICE-BRAID† Teffon Packing are strong, long-lasting, chemically inert. Withstand temperatures ranging from -120°F to +500°F. Extremely effective in reducing maintenance. require less gland pressure to effect an adequate seal. This results in longer sleeve and packing life, less downtime. Because of the interlocking braid construction, LATTICE-BRAID Packing will hold together far beyond the limit of other packings. Catalog AD-131.

garlock CHEMISEAL† Mechanical Social possess greater immunity to corrosion and are more economical than most other designs offered. Easy to handle and install, do not score shafts, engineered for long life. Available in standard sizes to fit all pump shafts $\frac{7}{8}$ " to $\frac{21}{8}$ ". Seals against most corrosive media at pressures to 100 p.s.i. at 75°C or 75 p.s.i. at 100°C. Catalog AD-164.

Garlock Teflon-jacketed Gaskets give you the advantage of using Teflon without sacrificing resiliency and deformability . . . particularly important on your glass-lined process equipment, light metal flanges, and glass pipe flanges and fittings. Garlock offers four basic designs—slit envelope, milled envelope, formed shield, double jacket—and a wide selection of filler materials and thicknesses. Catalog AD-154.

Garlock Solid Teflon and Teflon-lined Expansion Joints guard costly piping against sudden pressure surges . . . reduce flange breakage, prevent stress, compensate for misalignment. Solid Teflon Expansion Joints can be used against solvents, acids and caustics to 75 p.s.i. Teflon-lined Expansion Joints are recommended for pressures from 60 p.s.i. to 125 p.s.i. depending on pipe size. Catalog AD-137.

GARLOCK

Discuss the sealing of corrosives with your local Garlock representative—he will be glad to offer suggestions and other application assistance you may need. For prompt service, call him at one of Garlock's 26 offices and warehouses throughout the U.S. and Canada. Or, write The Garlock Packing Company, Palmyra, New York.

Connadian Div.: The Garlock Packing Company of Canada Ltd.

Plastics Div.: United States Gasket Company

Order from the Garlock 2,000 . . . two thousand different styles of Packing, Gaskets, Seals, Molded & Extruded Rubber, Plastic Products †Registered Trademark for TFE Fluorocarben Resin



CHEMISEAL Mechanical Seals are in wide service on rotary shafts of equipment like reaction vessels and pumps.

which acompate homoleculation, at was perduced a seried of the

LATTICE-BRAID Teffen Packings are used for rotary and centrifugal shafts, valve stems, and reciprocating rods, rams, plungers.



Solid-Teflon and Teflon-Lined Expansion Joints protect piping from pump, compressor, engine and pressure surges.



Tefion-jacketed Gaskets prevent leakage in glass-lined process equipment, light metal flanges, glass pipe flanges and fittings.



For more information on product at left, specify 1286 see information request blank opposite last page.





Stackable, safe-pouring space savers

Hackney chemical containers are built of Types 304 and 316 stainless steel. Bottom foot ring fits snugly over top ring of barrel beneath for safe stacking.

Saves warehouse space, handling time. Lightweight. Strong. Leakproof. Full-curled top, bottom rings provide full, comfortable gripping areas. Cut dropping, spilling to minimum. Splashproof spout optional equipment. Hold approximately 15½ gallons. For details, write:



Pressed Steel Tank Company

Manufacturer of Hackney Products
1463 South 66th Street, Milwaukee 14, Wisconsin
Branch offices in principal cities

CONTAINERS AND PRESSURE VESSELS FOR GASES, LIQUIDS AND SOLIDS

Check 1287 opposite last page.



RING GASKETS

For ring-type flanged joints in high-pressure lines. Made of soft iron, standard steel alloys or any non-ferrous metal to any desired cross section. Ask for Bulletin 563.



CORRUGATED METAL GASKETS Plain or jacketed type. Made of ingot iron, aluminum, stainless steel, copper, brass, nickel and monel in all sizes and shapes. Ask for Bulletin 565.





A HEAT EXCHANGER GASKETS Made in any size or shape needed in double-jacket type. Also cut from solid metal or sheet packing. Ask for Bulletin 564.

Write for literature

CHICAGO-WILCOX MFG. CO.

7717 So. Avalon Ave., Chicago 19, Illinois

Check 1288 opposite last page.

CORROSION CONTROL

Corrosive conditions not too tough for conveyors

An acetal resin material, called Delrin, permits conveyors to be successfully used under highly humid conditions or in an operation where unit must be washed or sterilized frequently by steam or waterchemical solutions. Aluminum also plays a part in providing corrosion resistance.

Acetal resin plastic ring replaces conventional steel balls



Delrin ring is shown inside aluminum conveyor wheel at right

in conveyor wheels. Aluminum used is a salt-water-resistant alloy.

Wheels using the plastic are virtually noiseless and 40% lighter in weight. Redesigned bearings for rollers also employ a Delrin ring.

(Corrosion-resistant conveyors are product of The Rapids-Standard Company, Inc., Rapistan Bldg., Grand Rapids 2, Mich.)

Check 1289 opposite last page.

(Delrin is product of E. I. du Pont de Nemours & Co., Wilmington 98, Del.)

Check 1290 opposite last page.



"There goes Gordon Y. Muller, He's a corrosion engineer."

TRY DARCOVA

FOR

- Higher pump efficiency
- Lower pump maintenance

IT'S a fact that hundreds of reciprocating pump and cylinder users today are standardizing on Darcova Pumcups because they eliminate fluid slippage, costly down-time and maintenance!

It's easy to check these claims right in your own plant. Behind this exceptional Darcova Pumcup performance lies texture-engineering and cup design that conform precisely to pressure-temperature-fluid conditions.



Pumcups of various types are analable in a complete range of sizes and texture-engineered compositions by your reciprocating pump and cylinder raquirements,

Why not get all the facts? Send today for Pumcup Bulletin No. 5903.

DARLING VALVE & MANUFACTURING CO.



Check 1291 opposite last page.

for uniform results

in...BAKING
DRYING
CURING
DEHYDRATING

select

YOUNG BROTHERS OVENS and DRYERS

designed and built for individual product and process requirements

Batch and Coriveyor Types up to 1000° F

Gas, Electric, Steam, Oil — Radio Frequency Power

Write for Bulletin 157.

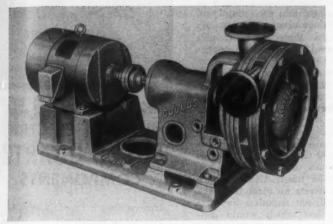
YOUNG BROTHERS CO.

1825 Columbus Road .* Cleveland 13, Ohio
Over 60 years of service



Check 1292 opposite last page.

CORROSION



Visible glassed surfaces are shown in color

Serious corrosion problem solved with glassed centrifugal pumps

While alloy pumps used at Sherwin-Williams had a short life, glassed units have shown hardly any wear after two years continuous service handling sulfuric acid and toluene.

PROBLEM: High alloy pumps previously used at The Sherwin-Williams Company, Chicago, Illinois, proved highly ineffective in handling corrosive chemicals used in the manufacture of paracresol.

Pump life under the adverse conditions was short and downtime was high. Plant was spending a considerable amount of money on maintenance in order to keep the pumps operating.

Solution: Sherwin-Williams engineers decided to try glassed centrifugal pumps in the paracresol plant. Interior of unit is glassed wherever the product being handled comes in contact with pump. Three-piece construction of pump simplifies glassing of surfaces and provides for flexibility in piping and installation.

Construction of pump per-

mits a thorough inspection when necessary by merely removing casing cover. Pipe connections need not be dismantled and alignment between pump and driver is not disturbed.

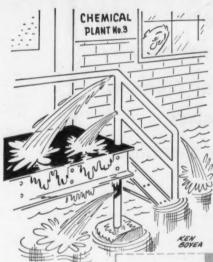
Type of Glass

Glass used in pump has a high degree of structural strength as a result of the chemical and physical bond between glass and metal, coupled with toughening effects of compressive forces built up in glass itself as it cools after firing.

Borosilicate glass especially formulated for pump is similar to chemical glassware. It will resist all acids except hydrofluoric at temperatures to 350°F.

Results: After being used for two years, pumps have

Life in these excited states...



Corrosion is full of surprises

All-purpose rigid PVC. Sched. 40, 80 & 120, ½ to 4". Threaded or socket-weld fittings. Valves ½ to 2". NSF-approved. Bul. CE-56.



Out-guessing corrosion has been our business for 100 years. We now make 8 types of chemical resistant pipe... with valves, pumps, and tanks to match... and pretty well know what to expect with them. If anything, our advice is on the safe side. Please consult us with any problem.

Improved design...now 12 gpm. All wetted parts acidresistant, wearresistant Ace hard rubber. Finest available. Bul. CE-55.



Flexible polypipe, ideal for water lines, drains, underground pipe or conduit. Sizes ½ to 2", long coils, NSF-approved for drinking water. Bul. CE-57.



World's best chemical valves ... at moderate prices. All-plastic,rubber-lined, or all-hard-rubber. ½" pet cocks to 24" gate valves.



AGE chemical resistant equipment

DIVISION OF AMERACE CORPORATION

ACE ROAD. BUTLER, N.J

See ACE equipment in Chemical Engineering Catalog

Check 1293 opposite last page.

How frequently are you faced with these . corrosion problems with valves in your operation?

- IXI CREVICE CORROSION
- IXI PITTING CORROSION
- X STRESS CORROSION
- INTERGRANULAR CORROSION
- **☑** UNIFORM CORROSION

Common problems...? Exceptional problem...? Which is it in your operation? Regardless of its nature, either common or uncommon, PACIFIC can help you bodyguard your operation against such corrosive elements with the proper selection of materials in valves of sound engineering principle and design.

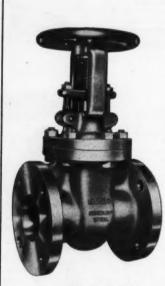


Figure Number 8550

Take for instance PACIFIC'S popular Figure Number 8550. Proper selection of material lends to its uninterrupted trouble-free performance. Lightweight pattern reflects sound engineering principle, providing maximum valve efficiency at a low initial cost! Heavy double discs, ball and socket design, ensure seat tightness and reduces hazard of galling. Tight fitting gasket joints prevent crevice corrosion on bonnet flange faces. Liberal internal areas reduce turbulence erosion of the body sections. You will find many uses for PACIFIC'S complete line of corrosion resistant valves in your operation . . . in steam, water, oil, gas, air, and numerous other types of corrosive services. For each application there is an economical solution . . . For each application there is a PACIFIC valve to do the job more efficiently-longer.

Write for corrosion resistant valves brochure.

PACIFIC VALVES, INC.

3201 Walnut Ave., Long Beach, California

PACIFIC SOUTHERN FOUNDRIES, INC. - Bakersfield, California PACIFIC FORGE, INC. - Fontana, California

PACIFIC PATTERNS, INC. - Paramount, California

Sales offices in most principle cities.

Check 1294 opposite last page.

CORROSION CONTROL

shown no appreciable wear from corrosion. No difficulties are anticipated in the future. Sherwin-Williams engineers estimated that the pumps paid for themselves the first six months they were in use. Glassed pumps are in operation 24 hours a day, seven days a week and work effectively 96 to 99% of the time.

Prevents Contamination

Because paracresol is a high-cost chemical, it is mandatory that all necessary precautions to avoid contamination be taken. Glass is inert and exerts no catalytic effect. It will not stimulate any side reactions which would contaminate product. Possibility of pump material corroding and contaminating product has been eliminated. In addition. glass prevents adherence of product, minimizing any shutdown for cleaning purposes.

(Glassed centrifugal pump is a joint development of Goulds Pumps, Inc., and The Pfaudler Co., a division of Pfaudler Permutit Inc., Rochester, N.Y.)

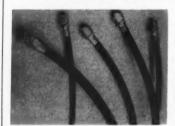
(For further information on glassed centrifugal pump contact Goulds Pumps, Inc., Seneca Falls, New York.)

Check 1295 opposite last page.

Nylon pressure hose is non-corrosive and durable

Uses: For such applications as hydraulic, lubrication, fuel and oil, hot paint, solvent, water, high-pressure pneumatic and CO, lines.

Features: Hose is non-corrosive, fungus-resistant, durable and light in weight. It re-



Pressure hose has excellent resistance to caustic and solvents



When purity is a "must"...so are

GENERAL ELECTRIC **FUSED QUARTZ** COMPONENTS

General Electric Fused Quartz Components are completely dependable. essentially free of contamination. And they're available in a wide range of stock items*.

Made of G-E Fused Quartz, they're attacked, but very slowly, by alkalies at room temperature—but not by hydrochloric, nitric or sulfuric acid at any temperature. Hydrofluoric acid will, of course, dissolve them at any temperature-as will phosphoric acid above 150°.

This purity, plus high temperature stability . . . make G-E Fused Quartz an ideal crucible material when purity of the melt is critical. (G-E Fused Quartz Tubing and Rod are amazingly resistant to high temperatures and thermal shock, and are available in a wide range of sizes.)

BOOKLET AVAILABLE. For full technical information, write for the publication, "G-E Fused Quartz". It's free, no obligation. General Electric Co., Willoughby Quartz Plant, Dept. CP-40, Willoughby, O.

*IMMEDIATE DELIVERY OF THESE STOCK ITEMS

Standard Taper Joints Ball and Socket Joints Graded Seals-Ouartz to Pyrex Crucibles Beakers Test Tubes Flasks **Evaporating Dishes**

Progress Is Our Most Important Product



Check 1296 opposite last page.

CHEMICAL PROCESSING

Subsidiaries:



SAG SILICONE ANTIFOAM

Now, from the laboratories of UNION CARBIDE, come new SAG Silicone Antifoams...that fight foam fast!

SAG Antifoams were developed after years of research to find the most efficient method of fighting foam. SAG Antifoams are effective in small quantities—often less than 10 parts per million! There are two types: SAG 470 Emulsion for aqueous systems; SAG 47 Fluid for non-aqueous systems. Only a few cents' worth eliminates thousands of cubic feet of costly, space-eating, storage-killing foam.

You'll like having SAG Antifoams handy. They are shipped to you ready to use and are stable in storage.

TRY SAG! Write for a handy sample today. This coupon makes it easy!



SILICONES

SILICONES DIVISION		DG-470
Union Carbide Corporation		
30 East 42nd Street New Yor	k 17 N	LV

30 East 42nd Street, New York 17, N.Y.
Send sample of () \$AG 470 emulsion; () \$AG 47
fluid; and data on \$AG Silicone Antifoams.

Name	Title		
Company			
Address			
City	State		
"Union Carbide" and "S	AG" are trade-marks of UCC.		

Check 1297 opposite last page.

sists flex and vibrational fatigue.

Description: Hose is made of a nylon inner tube reinforced with high-tensilestrength yarn and an abrasion-resistant cover.

Hose has excellent resistance to caustic and low Freon permeability. It is available with inside diameters to ½", with larger sizes furnished on special order. Max operating pressure runs to 2000 psi.

(Nylaflow hose is product of The Polymer Corporation, Reading, Pa.)

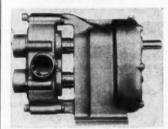
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Stainless steel pump handles high or low viscosities

Unit available in capacities to 100 gpm

Corrosive liquids of either high or low viscosity can be handled with equal ease by 316 stainless steel positivedisplacement rotary p um p. Slow-speed unit operates with minimum of turbulence.

Pump has helical timing gears, twin balanced impellers and single or dual mechanical seals. It is also available with packing gland seal. Packing



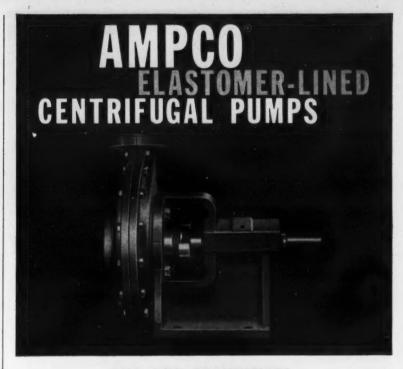
Self-priming positive-displacement pump

gland and mechanical seals are interchangeable in field.

Self-priming pump is available with capacities to 100 gpm against head pressures to 200 psi.

(Stainless steel pump is product of Pump Div., Waukesha Foundry Company, Dept. 76, 1356 Lincoln Street, Waukesha, Wisconsin.)

Check 1299 opposite last page.



THE ONE ECONOMICAL, SAFE, DURABLE PUMP THAT

HANDLES HCI

Eight sizes in stock — linings of natural rubber, Neoprene, and Hypalon. See your nearby Ampco Pump Distributor.

Saves you the extra expense of a special pump made from costly or dangerously fragile alloys — to handle muriatic acid — HCl, bleaching agents, mixed acids, cleaning solutions, plating solutions, abrasive slurries, and other destructive media.

Will not affect taste or color, nor introduce impurities into the material being pumped. Resists damage by stray currents in plating baths and from galvanic effects.

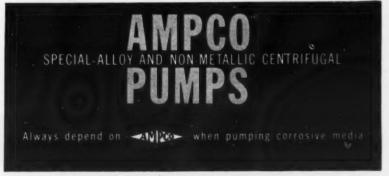
Capacities — heads range to 400 GPM and 100' TDH.

Write for free Bulletin P-6.

AMPCO METAL, INC.

Dept. 139-D. Milwaukee 46, Wisconsin . West Coast Plant: Burbank, California

P-34



Check 1300 opposite last page.



Piping Polysulfide

PIPE

Piping Sulphuric Acid Piping Hydrochloric Acid Piping Nitric Acid Piping Battery Acid Piping Vinegar Piping Brine Piping Natural Gas Piping Ammonium Nitrate Piping Gasoline Piping Fluoridation

materials water system Piping Sodium Hypochloride (Bleach) Piping Pulp Stock Lines Piping Uranium ore slurry Piping Sand slurry Piping Coal slurry Piping Waste Lab Drains Piping Cyanide **Piping Plating Solutions** Piping Mercury (tube filling)

Piping Pickles

Piping Wine Piping Gin Piping Whiskey Piping Sea water Piping Chicken feed Piping Demineralized H₂O Piping Warm glue Piping Salt water Piping Crude oil Piping Drinking water Piping Irrigation water Piping Chilled water Piping Sewage **Electrical Conduit** Fishing Boat Outriggers Stair Handrails Vent Stacks Stand Pipes Downspouts Cathodic Protectors Electrolytic Interruptors **Pneumatic Conveying**

FABRICATIONS

Plating fumes Hydrofluoric Fumes (Scrubber and duct) Meat Cutting Boards Spray Booths Roll Coverings Swimming Pool H₂O Treatment Chicken Feed Troughs Gutters Plating Racks Electrolyte Diffusers Agitator Noise Dampeners Sinks Laboratory Table Tops Photographic Trays **Etching Trays Pump Bodies Etching Machinery Tumbling Barrel Liners** Plating Drums Loading Chute Liners Laboratory Fume Duct Laboratory Fume Hood Tanks & Tank Liners

VAN-COR SOLVED THESE PROBLEMS BECAUSE IT IS:

Chemical Resistant Light Weight High in Tensile Strength Low in Flow Resistance

Impact Resistant Dielectric **Easily Installed** A Thermal Insulator







WRITE FOR INFORMATION AND NAME OF NEAREST DISTRIBUTOR

INDUSTRIAL DIVISION OF

COLONIAL PLASTICS MFG. CO.

Subsidiary of THE VAN DORN IRON WORKS CO.

2685 EAST 79TH STREET

CLEVELAND 4, OHIO

Check 1301 opposite last page.

CORROSION CONTROL

Neoprene coating cost reduced 50%

Uses: For coating pipe and tanks, damp surfaces, moisture barriers and equipment where resistance to salt water or mild chemical solutions is required.

Features: Coating provides many of the desirable qualities of a conventional neoprene coating at about half the price.

Description: Gacote NA-62 coating has a solvated composition containing a combination of neoprene and asphaltic/bitumen compounds. Neoprene contributes to the flexibility of the coating as well as to its resistance to abrasion, chipping, spalling, flow and sag. Asphaltic compounds contribute to economy, ease of application and adhesion.

Coating requires no primer. It can be applied to damp surface and will not crack in cold temperatures.

(Gacote NA-62 coating is product of Gates Engineering Company, Wilmington 39, Delaware.)

Check 1302 opposite last page.

ARE YOU A CARTOONIST?

If so, you can recognize humorous incidents in chemical processing operations that can be turned into profits for you.

CHEMICAL PROCESSING will pay: \$10 for black ink cartoons (with gag lines) on 81/2" x 11" sheets - ready to reproduce payable on acceptance.

\$5 for cartoon ideas - written descriptions or rough sketches of scenes - and cap-

Send your cartoon material to:

Cartoon Editor CHEMICAL PROCESSING 111 East Delaware Place Chicago 11, Illinois

Don't forget to include your name, address, and company affiliation.

VALUE ENGINEERING PROVES

ROCKWELL Resilient-Seated Butterfly Valves STAND OUT



- Weigh Less-Cost Less
- Need Less Space
- Easier to Install
- Always Operable
- Low Pressure Drop
- No Fouling
- Negligible Maintenance
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 - Manual or Remote

Bodies lined with any elastomer-from natural rubber to Viton.

Operates from simple lever to a matic and remate control. No lim

Let Bulletin 590X help you put vo engineering to wark on your valve ap cations. Just mail the coupon below

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Send me Bulletin 590X.

Title

Firm

Address

City

State

Check 1303 opposite last page.

CHEMICAL PROCESSING

NEW LITERATURE Corrosion Control

Corrosion-resistance chart more than 150 different chemicals recommended usage with ductile iron, iron, steel, 316 stainless, 304 stainless, Monel, brass, bronze, copper, aluminum and plastisol plastic. Chart also and plastiso plastic. Chart also shows what gasket materials are needed for various chemicals. Chart J-CRC — Jordan Corpora-tion, Div. OPW-Jordan Corpora-

Check 1304 opposite last page.

Glass-lined pipe, which can easily be cut in the field to required length, is described in eight-page Bul 989 — The Pfaudler Co., a division of Pfaudler Permutit Inc. Check 1305 opposite last page.

Positive-displacement pump for feeding concentrated corrosive chemicals is subject of bul 1331.20-1 — B-I-F Industries, Inc. Check 1306 opposite last page.

Stainless steel tubing is discussed in detail in 34-page booklet. Information is given on various sizes, grades, design data-and corrosion resistance on both welded and seamless types. Bul SS39 — Allegheny Ludlum Steel Corporation. Check 1307 opposite last page.

Centrifugal pumps for handling corrosive and non-corrosive liquids and slurries are discussed in tenpage bul. Considerable informa-tion is given on materials of construction. Form 9C-0217 — Dean Brothers Pumps Inc.

Check 1308 opposite last page.

Flex joints and bellows made from Teflon for corrosive and other difficult applications are described in four-page Bul SB-1 — Resistoflex Corporation.

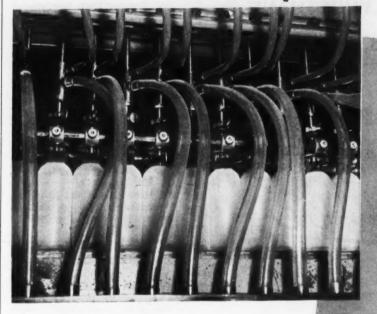
Check 1309 opposite last page.

Plastic fume ducts and other auxiliary equipment used for handling highly corrosive vapors are illus-trated and described in 18-page Bul B-500 - Heil Process Equipment Corporation.

Check 1310 opposite last page.

For more information on developments reported in this section. check corresponding numbers on Reader Service Slip opposite last page of this issue.

TYGON plastic TUBING can be particularly helpful



. . . if you

- HANDLE CORROSIVE LIQUIDS OR GASES
- TRANSMIT FOODS, DRUGS, BEVERAGES OR OTHER HIGH PURITY AND/OR SENSITIVE SOLUTIONS
- FACE SPACE LIMITATIONS
- REQUIRE VISUAL INSPECTION AND CONTROL OF FLOW

Tough, flexible Tygon plastic Tubing is resistant to an extremely broad range of corrosive gases and chemicals. In fact, it is the standard tubing in laboratories throughout the world, handling virtually all chemicals normally encountered. Clear as glass, it provides perfect visibility of flow.

In non-toxic, odorless and tasteless formulations, Tygon Tubing is almost universally the preferred plastic for handling milk, beverages and liquid or semi-solid dairy products.

Flexible as a piece of string, available in

continuous lengths, Tygon Tubing requires few joints or couplings, is quickly installed in minimum space. Its highly-polished bore provides outstanding flow characteristics, prevents interior build-up, permits simple flush-cleaning. Non-aging and physically tough, Tygon retains its unique combination of advantages throughout a long, trouble-free service life.

One of seven standard Tygon formulations will almost certainly meet your requirements. Special formulations have been developed for unusual needs. Over 65 standard sizes up to 4" I.D. are available.



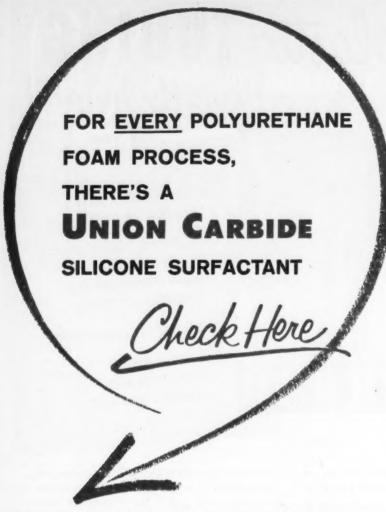
Get complete technical data on the various Tygon formulations, as well as other Write helpful information. today for free Bulletin T-100.

PLASTICS & SYNTHETICS DIVISION



AKRON 9, OHIO

Check 1311 opposite last page.



One shot, water blown flexible poly—
ther foam requires 0.3 to 0.8% of
UNION CARBIDE Surfactant L-520.
No other surfactant gives the good
stable rise, open cells and fine pores
so necessary for high quality use
such as cushioning.

One shot, fluorocarbon blown flexible

polyether foam for extra soft pillows
is almost impossible without UNION
CARBIDE Surfactant L-520. Gives a
good stable rise, too. Concentrations
up to 1.5%.

One shot, rigid polyester foam, such as

□ used for structural purposes, has virtually 100% closed cells with only 0.1 to 0.5% of XL-521.

Prepolymer, flexible polyether foam has

☐ 85% open cells, uniform structure
when 10 or 50 cstk. UNION CARBIDE
L-45 is used.

Prepolymer, semi-rigid polyether foam,

□ such as required in crash-pad applications, is best made with about 1 to
2% of UNION CARBIDE LE-452 metered in at the foam machine.

Prepolymer, fluorocarbon blown rigid
□ polyester foam, of the type used in refrigerator insulation, is 90% closed cells, has good rise and fine pores if made using between 0.1 and 0.5% of UNION CARBIDE XL-521 added to the prepolymer side. Closed cells hold fluorocarbon gas for low thermal conductivity.

LIKE TO KNOW MORE? Samples of these special silicone surfactants and Silicones Man technical aid from Dept. DG-4902, Silicones Division, Union Carbide Corporation, 30 East 42nd St., New York 17, N.Y. (In Canada: Union Carbide Canada Limited, Toronto 7.)

Unlocking the secrets of silicones

Rubber, Monomers, Resins, Oils and Emulsions

SILICONES

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Check 1312 opposite last page.

UNION

CARBIDE

Contractor Relations From page 25

WILLIAM P. GAGE

weeks or months in which time prices could change.

Turn-key Limits Creativity

It tends to stifle new ideas. No matter how good a plant is initially, its process as well as the design interpretation it represents can usually be improved by the contractor's and the operating company's engineering staffs.

The Cost-plus-Fixed-Fee (CPFF) type of contract is preferred for these reasons:

Cost-plus Flexible

Here the small company (contractor) is not insuring the large company (operator) as in the case of a turn-key job.

With cost-plus it is frequently possible to fix engineering and labor overhead costs. But this doesn't mean fixing the cost of equipment or erection, as CPFF permits changes during construction based on new developments or through engineering knowhow obtained from a pilot plant.

CPFF Danger-Don't Run Wild

Don't solicit too many bids when planning a plant. Proposals cost money. Engineering firms provide manpower and engineering know-how far too costly for most operat-

GEORGE P. FORBES

bination of delay and extra cost for his project resulting from his own indecision. Such indecision reduces effectiveness and progress of the work. Contractor personnel are keen to sense uncertainties in the customer's approach and many times these bring an unconscious reduction in activity. "Wait and see" becomes the watchword. Schedules are affected adversely and costs continue to mount. This is equally true when a sudden major change in the scope of the work is made by the customer. This may involve discarding a portion of the work in progress or the consideration of some entirely new concepts.

Until these are coordinated with the remaining work, confusion and inactivity often result. In either of these cases, progress suffers and costs rise uncomfortably.

It is also fundamental that the customer expects the contractor's organization be of top quality - particularly his engineering group. Under current conditions where the cost of labor and materials is constantly increasing, ingenuity and originality in engineering design and application are a necessity. The customer expects this approach, for it is only in this way that he can obtain a well designed optimum-cost plant that will assure him of a reasonable re-

ALAN T. KNIGHT

tractor who has violated his word by divulging a process from one company to another.

There has been a great deal of discussion about the type of contract a customer should choose. I personally feel the "guaranteed maximum" is a very good type contract for both the customer and contractor, but "firm bids" or "cost plus" are also fine provided you have confidence in

the contractor you select.

The advantage of a firm bid contract is that the client can determine what the job is going to cost if there are no changes nor extras. Usually there are and the question of added costs often becomes "sticky." The greatest disadvantage of this type contract is that the client may lose months of time before his plant is ready to operate, be-

ing companies to themselves maintain on a full-time basis. Customers should realize that engineering firms could be put out of business preparing proposals that don't often get the contract.

cey

Never let an engineering firm make a bid if you don't expect to award it the contract if successful. Some literally beg to bid. Qualifications and background should be checked before invitations are sent out, not after bids are in and it is determined who the low bidder is.

Never take expensive estimates as favors from engineering firms. If you want an estimate on a job that you may not go through with, pay for it. However, if an engineering firm has an exclusive process that no one else could bid on, you may then ask for an estimate without expecting to pay or be under other obligation.

In all dealings with engineering contractors, keep in mind that they perform vital services, replaceable only by impractically high overhead costs.

Let's recognize their contribution and work with them to get our plants well-built in the shortest time.

Remember, management is waiting for the plant to be operating profitably as soon as possible . . . and will be expecting the same next time!

turn on his investment. Unless a contractor can provide a skilled engineering group having a practical approach to problems that is well bolstered by operating and maintenance experience, designs may be hastily conceived, impractical, more expensive than necessary or less efficient than required.

Periodically, a contractor should review his philosophies of design and construction and incorporate modern methods and techniques to improve his mode of operation. To restrict initiative and blindly follow the popular concept of production engineering is not indicative of a progressive organization. For example, the

considered application of computers and scale models can result not only in a better design and a saving of project time; but, in addition, can free technical personnel for other important work necessary for the project.

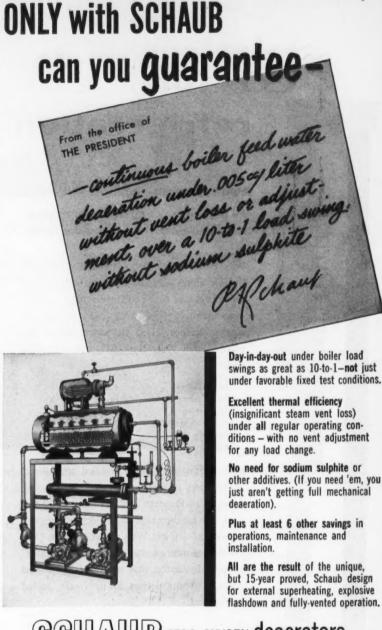
New methods should be seriously considered and used where practical; outdated methods have no place in today's mode of operations.

These elements are basic in contractor-customer relation-ships. Ideally, they are always present, for they are important from the standpoint of the success of a contract. They are essential so that both parties can, in retrospect, say "a job well done."

cause of the extensive preliminary engineering which must be performed and firm quotations obtained from suppliers. Because of the lack of detailed knowledge of the job, it is often necessary to include an excessive figure for contingencies.

With a guaranteed maximum contract, the contractor proceeds with the project as soon as engineering informa-

tion is developed to sufficiently define the scope of work. Often this takes only eight or ten weeks. This type of contract often holds an incentive for the contractor to do as economical a job as possible, thereby possibly increasing his profit. The split in savings should be somewhere around 75% for the customer and 25% for the contractor. I find this is to be realistic.



SCHAUB ZERO-OXYGEN deaerators

GET THE FULL FACTS -- SEE YOUR SCHAUB REPRESENTATIVE OR SEND FOR BULLETIN 575. EITHER WAY YOU WILL PROBABLY CHANGE YOUR IDEAS ON WHAT CONSTITUTES TRUE DEAERATION OF BOILER FEED WATER.

FRED H. SCHAUB ENGINEERING COMPANY

2112 S. Marshall Boulevard, Chicago 23, Illinois

	CLIP AND ATTACH TO YOUR	LETTERHEAD
Please send my pers	onal copy of Bulletin	575
Name		

CO₂ for refrigeration

Available Refrigeration Potential

As Dry Ice Approx. 275 BTU/Ib. As Liquid @ 0°F. Approx. 130 BTU/Ib.

Wherever refrigeration is needed, CO₂ does the job rapidly, economically and well. Here's the refrigerant that cools everything...without expensive equipment and with quick, clean efficiency. Here are just a few of the places where fast-acting CO₂ can save you money.

Chill grinding
Freeze drying
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Freezing tissue Investment casting Alloy treatment Dewaxing oils Rubber tumbling Hardening

Olin Mathieson CO₂ is handled and stored in a variety of forms and quantities ranging from "Low-Pressure" units to 24- and 30-ton tank cars for direct unloading to your process, as well as dry ice. Why not contact an Olin Mathieson representative soon for an informative discussion that may open new and more economical uses for this safe, tested refrigerant.

7334

Olin Mathieson CHEMICALS DIVISION, BALTIMORE 3, MD.



Check 1314 opposite last page.

Contractor Relations From page 25

THOMAS P. FORBATH

advantage of the engineering services available to the American chemical industry, particularly with respect to proprietary processes offered by various reputable contractors. While we could design sulfuric and nitric acid plants and a good many other of our basic production units, wherever we can obtain such a unit on a lump sum, turn-key basis from contractors who have demonstrated their ability of providing these processing facilities, we expect to always have such plants built for us.

A trend is apparent in the direction of more complex process plants becoming available from contractors on a lump sum basis. We intend to take full advantage of this trend. We likewise intend to utilize our own engineering forces primarily on plants incorporating processes which we have developed and which are not available through outside engineering firms. In cases where we can obtain a "package plant," we always satisfy ourselves beforehand as to the qualifications of the contractors offering such a plant. We do not invite bids from a contractor unless we are prepared to award the contract to him. In these instances we concentrate on drawing up detailed and precise specifications of the plant we want and award the contract on a competitive basis, as a rule to the low bidder.

Taking now the cases where, following our process research and development, we have ourselves carried out all required process and detailed mechanical engineering and have used outside contractors only for actual field construction work, our preferred procedure is to complete all engineering necessary to obtain lump sum bids for construction work. Similarly, where we have engaged outside architectural firms to design a new building for us, we expect, as a rule, to have drawings completed to the degree necessary to go out for lump sum bids before we engage a contractor. In all these instances as well we prequalify contractors and select, as a rule, not more than six from whom we invite lump sum bids to award the contract on a competitive basis.

We view our relationship with contractors as strictly two-ways. We work hard to make sure the scope of the project is completely defined and the contract and specifications drawn up in adequate detail to avoid possible misinterpretations. Once a contract is signed, our people are not to interfere with the contractor's work by any changes in scope and, conversely, we expect the contractors to finish their work without "extras." This is an ideal which we can only approach asymptotically. Our experience has been fairly successful in this regard, as a result of implementation of this operating philosophy by our people and by making it clear to contractors that we measure their performance not only in workmanship and time of completion, but as well in the absence of "extras".

Alternate Procedure

I fully realize there is something to be said for the alternate of proceeding with a selected contractor on a negotiated basis. This procedure, I believe, is particularly suited to organizations which do not themselves have fair-sized and well-staffed engineering departments. We feel that the company's interests are best served in the highly competitive chemical field by taking judicious advantage of a fair competition in the engineering and construction business.

We believe that our organization and the contracting firms complement one another. We feel strongly that we have very binding and important obligations towards our contractors and likewise expect them to take their commitments to us equally seriously. In conclusion, we believe that satisfactory customs and contractor relations depend first and foremost on mutual confidence and once such confidence has been established, more than half of the battle is won.

-109.3°F

Antidumping Act

From page 26

applicable) is necessary. Data as to price to the U.S. should also be included, and as to any obvious differences between the two markets, such as quantities dealt with and types of packaging.

Withholding of appraisement—is the first step in the direction of a positive dumping finding. Under withholding, while imports continue to enter freely, fixing of import duty is postponed until ft can be determined if a dumping duty (in addition to any ordinary duties) should be assessed.

Withholding is ordered only where there are reasonable grounds to believe or suspect sales at a dumping price. There can be a withholding instituted only a few days following receipt of complaint, and check with appraisers. Ordinarily, however, one must expect a greater time lapse before decision whether or not to withhold.

The price comparison - To make a valid price comparison, prices in the two markets must be reduced to comparable terms. Typically this can best be done by taking f.o.b. factory prices. As far as price to the U.S. is concerned, neither ordinary American duties nor transportation costs are included. If there are differences in packaging costs, they are adjusted out. Taxes imposed on foreign homemarket sales, but remitted on sales to our country, are also adjusted for. Adjustment is also made for quantity differentials and other circumstances of sale.

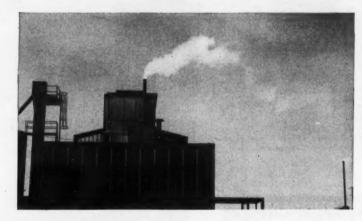
Quantity differentials — A simple case for a quantity-differential allowance would be if the foreign producer's catalog for home sales shows a price of \$1.00 per unit for sales under one ton, with a 10% discount allowed for sales in greater amounts. In this case sales to the U.S., in amounts over a ton at \$0.90 per unit, would be exempt from dumping duties.

The example in Table 2 shows that quantity allowances may be made if the foreign producer's home pricing shows a differential for large sales, even if not ex-



Before scrubber was installed — visible cloud is composed largely of water with about 0.5% sulfur trioxide

THE CHEMICO VENTURI SCRUBBER MAKES THE BIG DIFFERENCE



After scrubber was installed — water vapor has diminished considerably, sulfur trioxide content is practically nothing

With sulfur trioxide fumes being vented to the air in a thick vapor fog, Ansul Chemical faced an air pollution problem common to many chemical producers. They were willing and anxious to comply with community requests for pollution control, but they were unable to find a scrubber which could rid the stack of both the water vapor and the SO₃ as well.

While virtually any scrubbing device was capable of removing the water vapor, only the Venturi scrubber was effective in removing the acid fumes. By removing all but the last traces of SO₃ the Venturi scrubber gave further evidence of what can be done to solve really tough gas cleaning problems where conventional cleaning devices prove ineffective or uneconomical.

FULL DETAILS AVAILABLE

For your copy of a brochure giving complete data on Chemico Venturi gas scrubbers, or for technical assistance on a specific problem, write to Chemico at the address below.



CHEMICAL CONSTRUCTION CORPORATION Gas Scrubber Division 525 West 43rd Street, New York 36, New York

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токчо

Check 1315 opposite last page.



Check 1316 opposite last page.





Check 1318 opposite last page.

Antidumping Act

From preceding page

pressed in a catalog in terms of a percentage discount. In spite of the preponderance of home sales at \$0.85 per lb, the lower U.S. price is justified because the home price pattern shows \$0.80 per lb to be the prevailing rate for quantities of 1000 lb.

Circumstances of sale -Some observers believe that the Antidumping Act is designed essentially to hit injurious sales below cost plus profit. Such a theory can be justified only if one assumes that the law substitutes market price in place of cost wherever possible. This price represents the most expedient estimate of cost plus profit. Thus, foreign home price is used instead of cost if there is a representative home market; otherwise third-country price is used. Reference is made to cost only as a last resort.

Dumping as to price is judged wherever possible with reference to sales price. This being so, it seems logical to judge other circumstances of sale with reference to their effect on price, rather than to their cost (although the two may turn out to be identical in amount). In addition. the circumstances should have a reasonably direct relationship to the sale. An easy way to evaluate a circumstance of sale is to test it, as provided in a presently proposed amendment to regulations, according to the benefit or detriment to the purchaser.

Under this test, allowances will ordinarily be made, as circumstances of sale, for technical assistance and other services rendered the purchaser. Their inclusion to one sales contract will be a benefit, their exclusion in another a detriment. On the other hand, the fact that the foreign producer maintains a large sales force in one market and handles his sales in the other merely by correspondence will not ordinarily be permitted as a circumstance of sale.

Operation of the law — Necessary adjustments are thus made to bring the two prices (price to the U. S. and typically foreign home price) to a comparable basis. If the

THESE ALL-IMPORTANT

SERVICES

ARE YOURS WHEN YOU USE GENERAL AMERICAN'S AIRSLIDE® CARS

Testing Service—General American will pretest your product to determine handling characteristics. Tests conducted in General American's laboratories will assure the most efficient bulk handling of your product.

A fleet of cars is provided by General American for full scale road test operation when laboratory results indicate that your commodity's flow properties are marginal. **Supervisory Service**—General American will furnish experts to supervise your initial unloading. These specially-trained men are there to insure maximum efficiency of your unloading operations.

Maintenance Service—General American maintenance assures maximum "in-service" mileage for your Airslide Cars. A nation-wide network of maintenance shops is staffed by skilled technicians to keep your cars rolling.



price to the U.S. is or is like-

ly to be lower (as determined by the Treasury), the case is thereupon referred to the U. S. Tariff Commission. If

the Commission finds that American industry is or is likely to be injured thereby.

a dumping duty is assessed

to the amount of the differ-

ence between the two prices.

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New look at atom plant offered by portable TV

Remotely-controlled, portable television unit equipped with zoom lens is providing a "new look" at operations of General Electric's Hanford Atomic Products operation at Richland, Wash.

Unit is used in cells where plutonium is separated from unused uranium and fission by-products, and provides an "all-sides" view of what is happening in cell to which it is lowered by operators stationed in cranes 70' above. Previously, inspection had been limited to top view obtained with periscope.





"Professor, it's looking right back at me!"

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offers you...

- · fast reaction
- high purity

With CARBIDE's amyl alcohol, you get the fast reaction rate of a primary alcohol. This fast reaction rate increases efficiency and productivity-giving you savings in time, equipment, and money.

Large-scale and up-to-date production methods, efficient refining, and rigid specifications assure you a high-purity amyl alcohol . . . with no secondary or tertiary products, no halogen-containing impurities, and only traces of carbonyl.

This combination of fast reaction and high purity offers many cost savings-you don't pay for diluents or contaminants; you save on reaction time and production costs, there are no losses to by-products or residues.

High end-product quality and cost savings result from the use of CARBIDE's primary amyl alcohol:

· All primary alcohol content gives optimum yields and efficiencies in the manufacture of amyl xanthates, amyl nitrates, and oil additives.

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Prelude to Process Dynamics: Computer Control From page 23

loop control of the process variables. Importance of controlling these inner loops should be evaluated in design of new plants. Instead of arbitrarily using a \$700 per loop system, some loops should be self-regulated and some upgraded where control analysis so indicates. This can be done by process simulation studies using an analog, and in some instances, a digital computer to determine at engineering design phase the required dynamics and statics of control loops. Heretofore, control selection criteria have been uniform across-the-board treatment of all control loops with automatic reset gain and derivative function, a control valve of most economically maintained design, and a sensor with standardization. It appears that relatively complex control loops such as non-interacting control systems for application to multivariable processes will require the synthesis of transfer functions not readily handled by combinations of conventional one, two, or three mode controllers2.

Analog computer components are needed to provide these transfer functions. They would therefore be used in this capacity only in complex control loops with simple control loops probably still being handled by conventional controllers.

In addition, and for some critical applications calling for high resolution final control elements, the use of electrohydraulic actuators in connection with the computer components will probably be necessary.

Adaptive type control systems might also be added to automatically change to control loop gains to compensate for process gain changes at different thruput rates.

²Franks, R.G.E. "Optimized Multi-Variable Control for a Chemical Reactor," ASME/IRD Conference, Newark, Delaware, April 4, 1958.

Computer Use No. III — Faster Computation

It is obvious there is payout in 1) starting up plants with minimum of product specification period; 2) detecting immediate off-specification material and correcting it; and 3) optimizing maximum return on investment through fact conversion of product based on raw material costs and product demand which helps eliminate storing unwanted product or excessive inventory.

The process industries have been successfully building process plants with specific pilot plant building blocks. Although some equilibrium conditions are known, the exact interrelation of raw to finished material up to now has not needed to be defined to make a profit. In fact, there are still many chemical processes dependent on a plant operator for economic production. To look at such processes for complete comprehension to automate same, may never justify investment.

Until 10 years ago, we did not have computer time available among the process engineers to calculate in longhand the design of a process after obtaining a single satisfactory computer solution . . . let alone to inject variables of a design to explore other alternate choices. Through use of computers the heat exchanger surface, number of plates in tower, and optimum reactor diameter can now be investigated under scores of conditions which were left unexplored because of lack of fast computational facilities.

In spite of this, processes in general are much more difficult to define analytically because of the number of nonlinearities of reaction, flow, mixing, etc., and other special aspects — all of which require considerable simplification from the actual.

Simple measurements of fluid flow, temperature, pressure, etc., are only accurate to

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Check 1321 opposite last page.

Computer Control

From preceding page

1% of range on the average measurement. It is more difficult to obtain similar measurements in solid material. Most present-day unit process equipment has hold-up time and other time delays, which become self-regulating devices to a large extent preventing application of control technique from materially affecting results. However, the noticeable trend to higher pressures, temperatures, and larger flows coupled with smaller overall size processing equipment will effectively cut down this inherent stability in future plants.

Information Unavailable

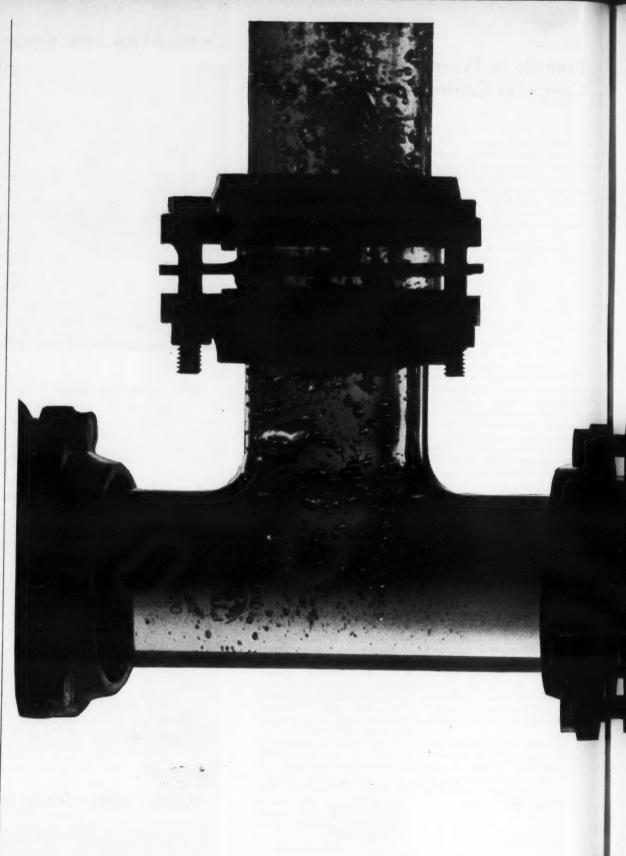
In the process plant all input information is inexact - ± 1 to $\pm 10\%$. Much information required to develop a mathematical model for better computer control is unavailable. Fast computational speed is dependent on one hour delay time before analysis of the product can be made in the laboratory because of lack of reliable analytical equipment for direct on-stream analysis. Computer programming is unwieldy since a number of nonlinearities defy simple optimization (chances are if the product were just coming out of the lab, more consideration in unit process design would have to be allowed for an ingredient of computer control).

There is a lack of chemical engineers — and this includes many of the process giants — willing to make full use of a new tool in designing plants.

There is a tendency for computer manufacturers to take sides regarding digital versus analog equipment. There is a lack of manufacturers and users experienced to apply control criteria.

Training Need Cited

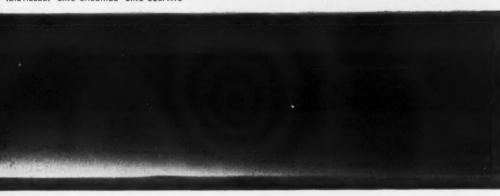
For maximum use of computer control, more engineers trained in computer techniques and theory must become designers of chemical plants. A number of companies are training their process and project engineers to operate simulation equipment, and in the use of digital and



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analog computers by working directly on machines.

In closing, a few words about application differences of analog and digital computers. Where accuracy of computation need only be ½ to 1%, analog computers can be used. Where greater accuracy is needed, digital computers should be employed. Very complex computations that require changes in programming require digital techniques.

Where dynamic control is required, the use of series digital systems can materially reduce the frequency response of the system. Parallel digital systems are no doubt fast enough but become costly compared to the analog.

Since small analog computers are in the \$10,000 to \$25,-000 range, I envision the more frequent use of such computers on unit operations equipment such as fractionating columns forcing columns to follow given parameters. This parameter related to an optimum of the unit and a telemetered signal of the operating value of optimum control will be fed to a plant-size computer basically of digital design; and the mathematical optimum economic model of plant will include price of raw material, sell price of various grades of product, process economics, inventory, and individual parameters - telemetered from the small computers in the plant. The control loop will be closed through resetting the individual local computers' operating point of the forcing function.

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Check 1323 opposite last page.

Diversification

From page 27

There are two distinct aspects of this stability. The first is the probability of holding on to each item of sales. Such stability is affected by product quality, marketing ability, quality of competition and similar factors. A rating scale could be devised to give reasonably good estimates of this aspect of stability.

There is another facet of stability that is independent of these factors. This is the mathematical distribution of the sales by product type, using industry, etc. The more "inherently" stable the company's products are, the less the need for stability through distribution, and vice versa.

Diversification Variables

There are several phases of a company's operations where stability through distribution should be examined. The principal ones are as follows:

- Number of product types in the line.
- Number of different products of each product type.
- Number of different industries served.
- 4) Number of different product uses.
- 5) Number of customers for each use.
- The distribution of sales within each of the above categories.

There should be an optimum number for each subdivision of the problem. It should be possible to find this optimum by considering that, at some level, each of these problems involves a random distribution of time.

A similar problem would be that of determining the optimum number of subordinates an executive should have. Assume that the consumption of the executive's time by his assistants falls into a normal or gaussian distribution pattern. If there are 10 assistants and 2400 minutes of executive time available to them each week, the probable distribu-

While it is not certain that this curve provides the best fit for the data, it is close enough for practical purposes. The principles developed here would be equally applicable, given another distribution pattern.

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tion of this time would be that shown in Figure 1.2

From the area under the curve it can be calculated that 20% of the executive's assistants—(1) and (10)—use only 1.6% of his time. On the other hand (5) and (6), taking up 45.1% of his time, are also 20% of his assistants. This distribution is summarized in Table 1 and plotted as Fig. 2.

General Application

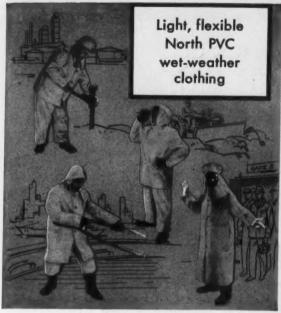
The curve developed in Figure 2 is of general value, independent of the example of executive time and assistants. It should be just as useful in determining the relationship between any distribution, such as total sales over a number of product types, or sales within a product type over a number of accounts. To illustrate this point, Alcolac's sales distribution by product types is also shown in Figure 2.

An interesting relationship in Figure 2 is the distribution of the subject under consideration over a varying number of recipient categories. For example, 50% of the recipients receive 88% of the distribution. This means that if there are two recipients, one (that is 50%) will receive 88%, while the other will obtain only 12%. Using this approach, Table 2 was constructed

As indicated in Table 2, there is little benefit in having more than five product types in the same departmental unit. The additional products receive a small percentage of time, thus producing a small percentage of total sales. This minor benefit may be more than offset by the reduction in effort on the major items, presumably with the effect of decreased sales and increased costs.

The sales of product variations within a product type should follow the same distribution. Therefore, the optimum number of product variations may be determined from chart in the same way. This relationship has consid-

2) Throughout this discussion the curve is assumed to reach zero at ± 3 sigma.



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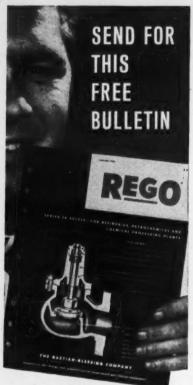
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Diversification

From preceding page

erable importance beyond that of diversification. It shows the "natural" distribution to be expected. Any major variation from this natural distribution, as in striving for equal sales, would require special effort to maintain it.

Number of Industries

Such a general approach can also be applied to determining the optimum number of industries to be served by a department. For this, another concept must be considered-that of the minimum amount of business from an industry that would pay for itself.

This would vary for each specific company. It would include (1) the cost per call on that industry, (2) the average number of calls required per \$1000 of sales, (3) the cost of supporting services required and (4) the profitability of the products sold.

Each company must work out this cost for its own situation. Assume that, for a department with \$5 million of sales, this minimum for profitability is estimated to be \$100,000, or 2% of total sales.

Every company has some miscellaneous sales in various industries, to which they pay little attention. Or there may be new applications just getting started. Based on experience, 3% might arbitrarily be selected to account for these miscellaneous sales. The optimum then occurs when 97% of the company's sales are to industries that purchase at least 2%.

From Figure 2 it may be seen that this occurs when the sales are distributed over 16 industries. This is obtained by observing, that, in going from 97 to 95% on the ordinate, the corresponding abscissas are 69 to 62%. Thus, 7% of industries represents the last 2% of sales. Since this 7% of the total is to be one industry, there should be only 16 industries served. Since we are not dealing with precise numbers, the optimum might be 14 to 18.

The same method can be used for determining the optimum number of applications



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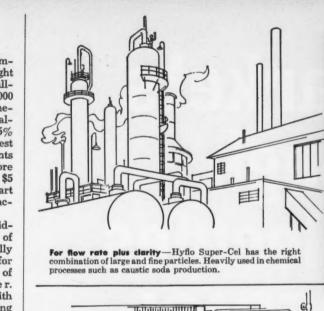
and of accounts. As an example in the latter case, it might be determined that the smallest desirable account is \$5,000 per year and that miscellaneous small accounts (principally unsolicited) represent 5% of the total. Then the smallest of the top 95% of the accounts must represent 0.1% or more of the business. For the \$5 million department, the chart shows this to be about 175 accounts.

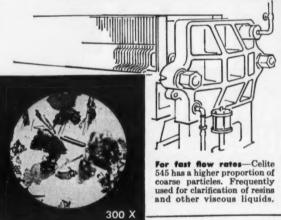
So far we have only considered the proper number of items in a class. An equally important consideration for stability is the distribution of sales among this number. Thus, a product line with sales equally divided among its members is more stable than one in which one item represents 90% of the total.

Since this discussion concerns a sales unit with random distribution of effort, it is apparent that the distribution within each of the above categories would follow the frequency pattern of Figure I. Deviation from this distribution indicates instability. By comparing the actual distribution with this standard, the extent of the deviation can be determined.

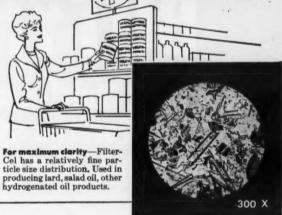
A simple technique for this comparison consists of listing all the items in the category in decreasing order of sales. A graph is then constructed with the abscissa the cumulative percentage of items, and the ordinate the cumulative percentage of sales they represent. A like curve is drawn for the standard on the same paper. This area between the curves is a measure of the deviation from the ideal.

A composite of all individual numbers can be constructed by means of proper weighting of individual factors. This "diversification coefficient" will provide a measure of a company's diversification trend over the years. No doubt, for every company that finds its operations insufficiently diversified, more than three will be over-diversified.









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This is essentially a simple problem. However, it involves considerable computation and so will not be treated here.

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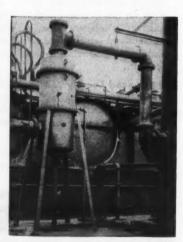


Centrifugal scrubber (boxed) shown next to one of the two 40-ft high towers it has replaced

Capable of replacing two 9-ft diam \times 40-ft high packed towers, compact 30-inch \times 8-ft centrifugal unit efficiently . . .

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PROBLEM: A simple, efficient, and low cost method of removing airborne pollutants from corrosive asphalt refining waste gas was sought by The Texas Company at their Port Neches, Texas plant. Bulky, 9-ft diam by 40-ft high packed towers used for this purpose had seen



Simple structure supports scrubber

their best days and required an increasing a mount of maintenance and repair to keep operating satisfactorily.

Contaminants in the gas stream consist of oil and asphalt carryover in the forms of liquids, solids, fumes, and odors. These range in size from large droplets to submicron particles. Gas volume at atmospheric pressure averages approximately 5600 cfm. Temperature varies between 350 and 500°F.

Solution: Engineers installed a space-saving centrifugal scrubber measuring only 30 inches in diam and 8 ft high. Made entirely of monel except for its flanges, the unit has no filters, screens, or other moving parts. Maintenance requirements are almost nil.

In operation, waste gas enters bottom half of scrubber and spreads out in the lower chamber where it combines with water. Passage through scrubbing tuyere blades imparts rotary motion to gas.

Action mixes gas with water spray and throws emulsified contaminants onto inner wall of scrubber and down into reservoir for removal.

Gas leaving scrubbing tuyere passes upward into series of tangential slots in upper or drying tuyere. Any pollutants carried over from scrubbing element are removed in this upper tuyere. Additional set of water sprays provide cleaning of outer surface of tuyere. Contaminants enter annular raceway and discharge through drying stage drain. Only clean gas passes into atmosphere.

Shipped as a completely assembled unit, the scrubber can be quickly installed at minimum cost. Contrary to the old packed towers which required heavy foundations (because of their 1¼-inch thick steel walls and 4-inch concrete linings), the centrifugal unit can easily be mounted on an angle iron support or some other simple structure.

Results: Occupying only a minimum amount of space, the centrifugal scrubber removes air pollutants effectively and economically. Although actual efficiency has not as yet been scientifically measured, performance has shown that one centrifugal unit is capable of replacing two of the old towers. The latter are being promptly replaced as soon as they become inoperative.

Compact design of the centrifugal scrubber permits low initial cost and use of materials resistant to numerous corrosive agents. While provision has been made in the design for easy servicing, absence of moving parts assures essentially maintenance-free operation. Unit's self-cleaning feature also contributes in this respect.

(WD scrubbers are designed and engineered by Centrifix Corporation, 3612 Payne Avenue, Cleveland 14, Ohio.)

Check 1426 opposite last page.

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SERIES RE comes in a full range of mixer sizes and mountings for open or closed tanks.

LOW-COST MIXER

Here's bow to save money on fluid-mixing operations that don't demand the ultimate in shutdown insurance

In new lower-cost Series RE LIGHTNIN Mixers, you get all the advantages of LIGHTNIN construction except for hollowquill drive. The speed-reducer output shaft is coupled directly to the mixer shaft, rather than through a flexible coupling as in the regular Series E LIGHTNIN Mixer.

Because of this one difference, we DO NOT recommend the new Series RE line for critical operations in which an accidental overload on the mixer shaft could cause a costly drive failure. In such applications, our regular Series E design gives you maximum protection against process shutdown—a degree of insurance you get with no other mixer.

For any job that doesn't demand this high level of protection, you'll find the new Series RE LIGHTNIN Mixer hard to beat on first cost—and on performance. It's the only mixer in its price range that gives you all these advantages:

- 1. Efficient right-angle drive-in all
- 2. Low-headroom shape-in all models
- 3. Easy-to-get-at change gears-in all

Plus: Precision bevel drive gears. Shaft bearings spaced to keep span and deflec-tion to a minimum in accord with AGMA standards. Speed quickly changeable in case process requirements ever change. Splash lubrication throughout. Dry-well leak prevention. Many other refinements such as weatherproof oil-level gauge, weatherproof breather, clear-flow crank case drain nipple, conveniently placed neoprene-covered grease fittings

You can get the new Series RE in a full range of sizes, in your choice of six different mountings for open or closed tanks, and in literally hundreds of standard power-speed combinations. Wetted parts in carbon steel, 304 and 316 stainless steels are carried in stock.

Get the story new. Ask your LIGHTNIN Mixer representative to show you how new Series RE gives you more mixer than ever for the money—and where you can apply it for greatest savings. He's listed in Chemical Engineering Catalog and in the yellow pages of your telephone directory. Or write directly to us.

Lightnin Mixers...

MIXCO fluid mixing specialists

MIXING EQUIPMENT Co., Inc., 185-d Mt. Read Blvd., Rochester 3, N. Y. In Canada: Greey Mixing Equipment, Ltd., 100 Miranda Ave., Toronto 19, Ont.

Check 1427 opposite last page.

PROCESSING EQUIPMENT

Liners easily interchanged on fluid energy grinding mills

Prevents abrasion, minimizes danger of contamination

Uses: Fine grinding various materials in chemical and allied industries.

Features: Mill is easy to clean. Grinding chamber lineers may be interchanged to insure proper liner for specific product being processed.

Description: Mill operates on fluid energy principle. Unit consists essentially of a tubular grinding chamber connected to a classification chamber.

Two opposing streams of energy meet head-on in tubular chamber. Jet carrying feed material into mill and jet blowing coarse and unfinished material from classification chamber collide at impact velocities of up to 1000 fps or higher. Classified fine material passes to conventional dust collector system. Unfinished material bypasses exit, is carried back to grinding chamher.

Processing may be arranged so that product is taken off in selected atmosphere and sealed from air. Dry ice or other special cooling systems can also be incorporated.

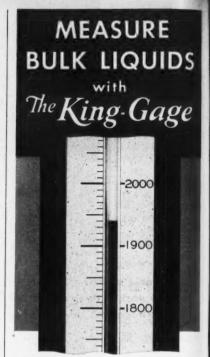
Mills are available in various sizes. Power consumption using compressed air or superheated steam ranges from 100 cfm of free air or 300 lb per hour superheated steam to 1000 cfm air or 3000 lb steam per hour.

Units of this type have ground material such as titanium boride to 80% below one micron.

(Further information about Trost jet mills may be obtained from Engineered Materials, P. O. Box 363, New York 8, New York.)

Check 1428 opposite last page.

For more information on developments reported in this section, check corresponding numbers on Reader Service Slip opposite last page of this issue.



Gain Accuracy, Save Time, Eliminate Risk or Doubt

With the King-Gage, you can measure the weight, depth or volume of any liquid in any storage or processing vessel - - quickly, safely and accurately, from any desired location.

Throughout industry, King-Gages are guarding against shortages, errors in receipts and deliveries, inaccuracy in mixing and formulating, and losses in processing. They eliminate the hazards of climbing on tanks; and in manhour savings alone, they often pay for themselves in 6 to 12 months.

King-Gages work as a frictionless balance, with no wearing parts - - operate on the U-tube principle, whose accuracy is inherent. They measure continuously and are read at a glance. Scales are graduated in any units desired.

Serviced Locally, There's a King-Gage distributor near you, factorytrained to discuss application details and to give prompt service whenever needed. You can depend on him.

KING-GAGE CATALOG 1010 gives further details; shows many applications. Write for it.



Check 1429 opposite last page.

CHEMICAL PROCESSING

THAT'S

Stabilizer real 'cool'

Discoverer satellites are being kept positionally stable as they spin around the earth with the help of a chemical originally developed as a refrigerant. In satellite's guidance system, "Freon-14" tetrafluoromethane (boils at -198°F) is used along with nitrogen to provide thrust to change attitude.

Do-It-self car—\$22

Basic raw maaterials used in \$2,000 car cost \$22, if you don't consider cost of labor utilized in processing and fabricating them. It takes 41/2 tons of coal. 23/4 tons of iron ore, 50 lb of cotton, 14 lb of finished wood and/or other materials. Labor costs add up to \$1200. and taxes add \$500 to cost of car.

more information on product at right, specify 1430 see information request blank opposite last page.

ECO ENGINEERING

ENGINEERING H

the big name in small pumps for the process industrie

Pumping Notes

"Doctor Takes Own Medicine"



Eco GEARCHEM Pump, made of zirconium metal supplied by Carborundum Metals Company, is used in highly corrosive sludge pick-up service at a Carborundum plant. The environment is HCl (3N), H,SO, (3N), H,SO, (5N), methyl isobutyl ketone and 3 normal thio cyanic acid at ambient temperature.

Gears, bearings and packing are du Pont Teflon.

Get Complete Corrosion Data On Zirconium and Titanium

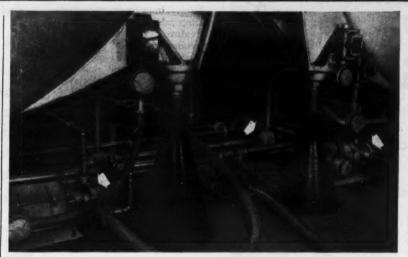
Are you sure that some of your most serious corrosive pumping problems, that stem from high temperatures, pressures and concentrations of reactants, cannot be solved readily with Eco Pumps made from one or the other of these atomic age metals?

A new 8-page Table which gives typical dynamic corrosion resistance values of zirconium and titanium, will help you find out. Write for your free copy.

Ask for Literature on These ECO Products for Handling Corrosive and Hazardous Fluids

ALL-CHEM® Rotary Pumps MINILAB® Rotary Pumps GEARCHEM® Gear Pumps CENTRI-CHEM®

Centrifugal Pumps
PUMPMOBILE®
Mobile Pump Units
GEAR-VAC® Valves
CHEM-COCK®
Safety Drain Valves



Eco CENTRI-CHEM Pumps under storage tanks at Nestie-Le Mur plant. Unique manifold arrangement permits pumping any desired product to various filling stations.

"Nothing Worked Until We Tried CENTRI-CHEM Pumps"

Nestle-Le Mur—originators of the "permanent wave" and producers of many hair beautifying products and other toiletries—had an extremely difficult pumping problem; transferring solvents in which certain gums were dissolved.

Packings Torn to Shreds

Pumps with conventional shaft packings were tried but, on intermittent operation, the gums solidified in the stuffing box when the pumps stopped and the packings were torn to shreds when the pump resumed operation.

Pumps with conventional mechanical seals also gave extremely short service life—at most, a few weeks, before becoming gummed up and inoperative.

Tried Centri-Chem Pumps

Finally the company tried Eco CENTRI-CHEM Pumps and the problem was solved. The rotary seal of these centrifugal pumps refused to gum up and the pumps are giving considerably better than a year's service without repairs of any sort.

Standardized on Centri-Chem

As a result, the company has standardized on Eco Centri-Chem Pumps throughout the plant.

They are used for two principal services: First, product transfer from storage tanks to aerosol can filling machine lines where hair sprays are packaged. In some cases, these filling machines are as far as 300 feet from the storage tanks. Second, feeding

filter presses which clarify the bottled products prior to packaging.

Keep Plant Going

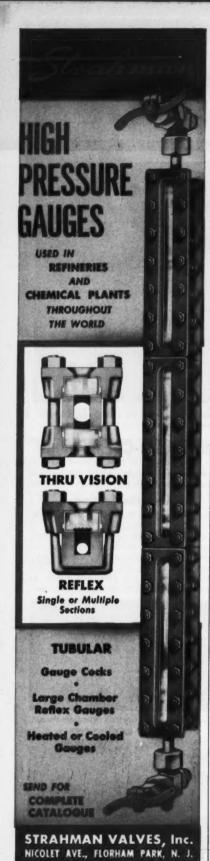
Since both of these services are vital to continuous production lines, it is obvious what disruption to the entire plant's output would be caused by pump failure. Reason why Chief Engineer William Z. Nesin remarks, "life has been almost a pleasure since we installed our CENTRI-CHEM Pumps."



Close-up of one of the CENTRI-CHEM Pumps in product transfer service.



Eco CENTRI-CHEM Pump feeding filter press:



Check 1431 opposite last page.

PROCESSING EQUIPMENT

Central control panel simplifies operation of impregnator

Improves efficiency, cuts operator fatigue

Uses: Impregnating metal casings and castings.

Features: All controls and instrumentation are mounted on centrally-located panel.

Description: Basic machine consists of 365-gal autoclave, 500-gal working capacity seal-



Impregnation unit consists of autoclave, sealant-holding tank, and purge-rinse tank

ant-holding tank, and 500-gal purge-rinse tank. Unit is recommended for use with metaloxide type sealant materials.

Designed for pit installation, equipment is provided with slip-free, steel, grate-type operating platform. Sealant tank is equipped with gear-motor agitator which mixes without introducing air into sealing fluid. Pressure blow-back is used to clear all lines following impregnation phase of autoclave cycle.

(Impregnation unit is product of Prenco Manufacturing Corporation, 2605 W. 14 Mile Rd., Royal Oak, Mich.)

Check 1432 opposite last page.

Polypropylene fiber used to weave filter cloth

Fabrics resist chemical attack, temperatures up to 275°F

Uses: Filtering wide range of chemicals.

Features: Polypropylene filter fabrics are chemically resistant to many acids, alkalies, and solvents. Cloth can be used under abrasive conditions at temperatures up to 275°F.

Description: Line of mono-

Engineered for Unmatched Quality

ROCKWELL OVENS

Bench, Cabinet, Truck and Conveyor Types

Electric · Gas

Convection Heating for Fast, Uniform

- Drying
- Baking
- Curing



Bulletin 127 describes the many types of Rockwell Ovens available for specific heat processing operations. Write for a copy.



W. S. ROCKWELL COMPANY

FURNACES . OVENS . BURNERS . VALVES . SPECIAL MACHINERY

2200 Eliot Street . Fairfield, Conn.

Check 1433 opposite last page.

MIX BETTER BY



IMPACT



Finer and more intimate dispersion of solids can be achieved using an Entoleter® centrifugal impact mill.

- . Low cost low power requirements
- Minimum (controlled) temperature rise

RECENT APPLICATION

For the final dispersion of detergent, bleach, perfume and highly abrasive silica flour in a popular powdered household detergent, this 27" model with abrasion resistant impactors does the job.

Sena tor literature on Impact Milling, Particle Size Reduction and the new line of Vibrating Screens.

ENTOLETER DIVISION OF SAFETY INDUSTRIES, INC.

Check 1434 opposite last page.



Multiple batches of similar or different materials can be economically ground, pulverized or mixed simultaneously on a versatile Abbé Jar Rolling Machine.

Jars, bottles or containers of different sizes can be used at one time. Each jar can be removed after its full grinding or mixing cycle has been completed—without stopping the machine.

Modern, rugged Abbé Jar Rolling Machines are available to handle single or parallel rows of jars, and in double or triple tiers for processing as many jars as required. Standard porcelain or steel jars range in size from 1 quart to 6 gallons. Built-in storage cabinets on tiered machines are optional.



abbe ENGINEERING CO.

Designers and Manufacturers of Ball, Pebble and Jer Mills - Pulverizers Sifters - Cutters - Milers

Check 1435 opposite last page.

PROCESSING EQUIPMENT

filament and multifilament polypropylene filter fabrics are available as fully fabricated elements or as yard goods. Fabric weaves range from very open to extremely tight duck types. Latter are recommended for use on slimes, pigments, and gelatinous precipitates. Built-in affinity to cleanliness minimizes blinding and cleaning time.

Because of their inherent slickness, the polypropylene fabrics simplify cake release on plate-and-frame rotary, and pressure-leaf filters.

(Polypropylene filter fabrics are product of Technical Fabricators, Inc., 136 Washington Ave., Nutley, N.J.)

Check 1436 opposite last page.

Economic H₂SO₄ cooling done by impervious graphite exchangers

Low cost cooling of sulfuric acid anodizing solution is being accomplished through use of two impervious graphite heat exchangers at the plant of a large aluminum processor.



Graphite heat exchanger has high heat transfer capacity, needs minimum maintenance

Displaying high chemical resistance and requiring little, if any maintenance, the exchangers keep 3100 gals of acid at 70°F.

The units' impervious graphite tubes are 15 ft long. Cooling water at 40°F is used. Total heat transfer is about 290,000 Btu per hr.

Similar units have found wide use for heating or cooling hydrochloric, hydrofluoric, nitric, phosphoric, and other acids.

(Norcordal heat exchangers are fabricated by Heil Process Equipment Corporation, 12901 Elmwood Ave., Cleveland 11, Ohio.)

Check 1437 opposite last page.

SIFTING?

...do it better, faster, at greater profit with



ro-ball sifters

Choosing from the long line of standard Day Ro-ball Sifters offers many advantages, including: six different sizes—one to four screens (single screen units carried in stock)—two to five separations—gyrating action—super active ball cleaning—rugged heavy duty construction.

If your production requires sifting, you'll want a Day Ro-ball Sifter data sheet, listing all dimensions and specifications. Write today.

PLASTICS
FEEDS
CHEMICALS
FOODS
COSMETICS



Check 1438 opposite last page.

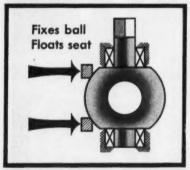
Can A Ball Valve Operate, Cycle After Cycle, With No Maintenance At All?

Read this remarkable answer, and discover an amazing engineering feat.

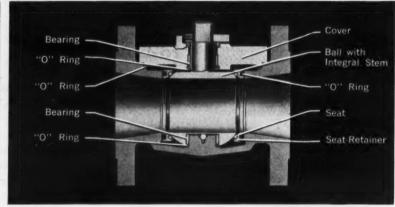
As most engineers know, ball valves offer a number of distinct advantages over all other types of valves . . . 90° on-off, minimum pressure drop, positive on-off indication, no lubrication, and compactness. In common with other valves, however, the design was insufficient to overcome the problem of continual maintenance.

Four years ago, this problem was faced by Hydromatics, Inc. in the valves that they produced for use in missiles, aircraft and ground support systems. Then, as today, all other ball valves were built with a ball that floated in its socket, and sealed by being forced sagainst its seat by the pressure in the line. This caused seat distortion which made early replacement necessary.

Hydromatics tried a different approach. Rather than use the traditional floating ball, their engineers fixed the ball in bearings.



In the bearing-fixed FLO•BALL valve all pressure forces exerted on the ball are transmitted to low-friction bearings, thus eliminating down-stream seat distortion due to ball load. The pressure balanced seat, with its teflon sealing surface, is continually self-adjusted by the O-ring in the seat retainer.



This O-ring acts as a self-energizing force that keeps the teflon seat always in contact with the ball. This insures positive sealing without seat distortion, and minimizes seat-resisting frictional forces. The combination of these low frictional forces results in low operating torque and extremely long seat life.

The bearing-fixed FLO•BALL valve proved itself immediately. Hundreds of missile and spacecraft systems, previously impossible, were made possible with these valves. The X-15, America's first manned space vehicle, for instance, has a Hydromatics FLO•BALL valve at its heart. Since its inception, the FLO•BALL has been used in more varied applications than all other ball valves combined.

Now, after the toughest application testing in history, bearing-fixed FLO•BALL valves are being mass produced for industry. They are available for off-the-shelf delivery to standard ASA dimensions in semi-steel, carbon steel, stainless steel, and aluminum. They operate at pressures to 600 psi, temperatures to 400°F and hold vacuum to 10-6 mm. of Hg! The bearing-fixed FLO•BALL offers extra ball valve advantages. Top loading for easy access without removing the valve from the

line, plus three features that are absolutely unique! Self-adjusting seats which automatically compensate for wear, proportional sealing force which automatically increases with line pressure, and the lowest torque, by far, of any valve. These combine to make the FLO•BALL valve virtually maintenance-free!



How long does it last without maintenance? Frankly, we don't know, since the first valves we ever built are still going strong and outlasting other valve types by more than 10-to-1. But don't take our word for it. See for yourself. Call, write or TWX for further information.

Hydromatics, Inc.

Livingston, New Jersey Telephone: WYman 2-4900 TWX-LIVINGSTON NJ 120 PROCESSING EQUIPMENT

Grind, mix, or blend wet or dry products with compact device

Uses: Batch or continuous grinding, mixing, blending, and dry granulating.

Features: Unit is compact. Ease of changing speed and screen size quickly adapts it to wide variety of wet or dry materials.

Rotor is directly connected to variable-speed motor, eliminating need for belts.

Description: Constructed of stainless steel, machine has relatively low initial cost and is available in three sizes. As a dry granulator, maximum



Disintegrator has rotor connected direct to variable-speed motor, bypassing need for belts

uniformity of granules and minimum generation of fines due to centrifugal attrition is achieved by variable-speed control. Use of interchangeable 360° screens minimize temperature rise of product.

For operations that do not require variable-speed control, single-speed control units are also available.

(RP model angle disintegrator is product of Rietz Manufacturing Company, West Chester, Pennsylvania.)

Check 1440 opposite last page.

Hinged side panel gives quick access to pellet cooler

Uses: Cooling and drying pelleted or small diameter products.

Features: Simple hinged mechanism permits rapid and complete opening of louver panel on each side of cooler. This allows for quiek interior

PROCESSING EQUIPMENT

cleaning when batch-to-batch contamination is to be avoided. Description: Vertical unit cools and dries with minimum of fines or dust leakage. Stain-



panels on cooler swing permit easy accessibility to unit's interior

less steel construction is used on all critical parts coming in contact with moisture-laden air and material being handled.

As product flows downward through cooling sections, transverse air streams accomplish cooling. Louvers are built into full height of cooling tower. An inspection door is located in one of the end sections of the cooler.

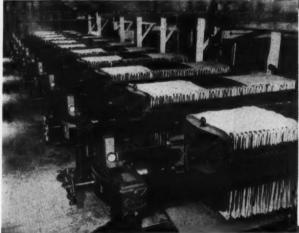
(Cool air vertical coolers are product of Sprout, Waldron & Co., Inc., 130 Logan St., Muncy, Pennsylvania.)

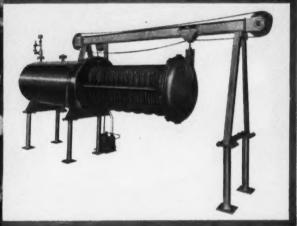
Check 1441 opposite last page.



"They gave us the business and made us all vice presidents-now what do we strike for?"

HOW SHRIVER SELLS FILTRATION NOT THE FILTER





In a Southern sugar refinery processing cane sugar mud, the filter presses had been supplanted by clarifiers and vacuum filters. However, it was found that by this continuous filtration method, too much sucrose was retained in the cake, and the filtrate still contained up to 12% of undesirable solids. This necessitated return to the clarifiers, thereby reducing production. The problem was particularly severe during the rainy season.

Some old filter presses were then put back into service and the sucrose loss was reduced. Better recovery, a higher degree of filtrate clarity and purity, and increased production resulted in greater profit.

Later, 20 additional Shriver filter presses were installed.

A vegetable oil refinery had ordered a Shriver 550 sq. ft., 23 cu. ft. plate and frame filter press for recovery of bleaching clay from vegetable oils. Strange to say, we were not happy about the situation. Our reexamination of this application suggested that a 48" horizontal tank, vertical leaf pressure filter with only 240 sq. ft. of filter area, but with 30 cu. ft. of cake capacity, would produce heavier cakes and would be easier and faster to clean in less down-time.

Result: The customer heeded the advice, cancelled the filter press and installed the Shriver leaf filter, with production consequences that more than justified the change in the order.

These are but two examples among many of how the Shriver approach to filtration problems, based on careful technological studies, results in the recommendation of filtration equipment (sometimes not our own) best suited for optimum processing efficiency and economy.

Such unbiased evaluation in your best interest we believe pays off in good will and good business. Let us work with you when you next consider expansion or improvement in your filtration processes.

T. SHRIVER & COMPANY, Inc.

846 HAMILTON STREET, HARRISON, N. J.



Presset



Filters



Horizontal Tank Leaf Filters



Rotary Leaf Sluicing Filters



Vertical Tank Leof Filters



Harizontal Plote Filters



Filter Media Textile - Paper

Check 1442 opposite last page.



1. Economy of operation on light loads?

The Yarway No. 30 gives you closer control—discharges condensate at full capacity, closes immediately on steam.

2. Longer service life?

Yarway's lever action reduces impact on valve seat—lessens wear, gives longer operating life. Quieter operation, too!

3. Lower maintenance?

Only Yarway offers an Impulse trap with renewable seat and disc that can be replaced without removing the trap from the line.

Why settle for less? Get all three money-saving advantages with Yarway No. 30—plus these time-proven advantages of all Yarway Impulse traps: quick heat-up, even temperatures, small size, stainless steel construction, non-freezing.

Nearly 1,300,000 Yarway Impulse traps already installed. Stocked and sold by 270 Industrial Distributors. Ask *your* distributor to arrange a free 90-day trial in your plant. Or write us.

YARNALL-WARING COMPANY 100 Mermaid Ave., Philadelphia 18, Pa.



Check 1443 opposite last page.

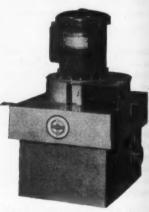
PROCESSING EQUIPMENT

Compact dust collector fits on, or under work bench

Uses: Dust control in low-volume dust-producing areas.

Features: Low-cost collector stands only 21½" high and occupies 12 x 14" floor space. Unit can be conveniently located on or under work benches.

Description: Dust collector uses efficient, fire-resistant, throw-away glass filter medium. Performance range under standard test conditions are 200 cfm; velocity, 4100; static



Midget dust collector occupies 12 x 14" floor space, can handle 200 cfm

pressure, 1.7" wg; inlet, 3". Machine is equipped with a 1/3 hp motor. Price is under \$150

(Model-301 dust collector is product of Torit Manufacturing Company, 1133 Rankin Street, St. Paul, Minn.)

Check 1444 opposite last page.

Wound-wire porous metal filters mild corrosives at 400°F

Uses: Filtering mildly corrosive fluids at temperatures up to 400°F.

Features: Pore size of wound-wire porous media ranges from 2 to 1000 microns or more.

Description: Low cost wound-wire porous metal filter elements can be used without external or internal support. Precision wire winding process forms material into hollow cylinders or cones. Wound-wires are bonded with silver or copper braze at all contact points in continuous, controlled-atmosphere fur-



Samples of shapes that can be made with wound-wire porous metal

naces. Brazing is followed with an electroless nickel plating.

Elements can be made from almost any metal that can be drawn into fine wire. This includes carbon steel, 400-series stainless steel, and other lowalloy stainless steels.

Layers of wound wire may vary from as few as four to as many as 30. Depth filtration permits removal of high degree of subnominal sized particles. Filter elements are easily cleaned by conventional back washing.

Non-filtration applications are also being investigated. Cylinders formed by the wire winding process can be cut, opened, and flattened for forming variety of shapes. Products are readily adaptable to fabricating and forming techniques such as stamping, punching, spinning, swaging, welding, etc.

(Poroloy-CS, wound-wire porous metal, is product of Bendix Filter Division, Bendix Aviation Corporation, 434 W. 12 Mile Rd., Madison Heights,

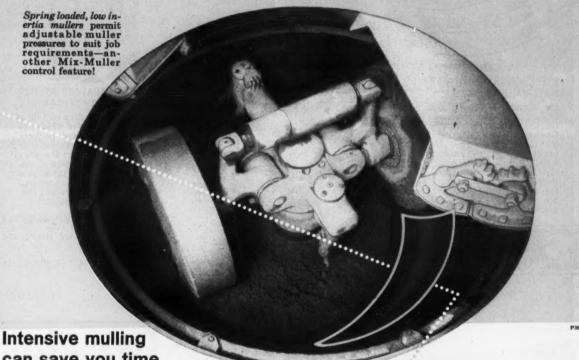
Check 1445 opposite last page.

Screening machines - their design, operation, and application— are topic of illustrated 32-page book. Three-page table shows relationship between various meshes and grades of silk, nylon, and wire cloth according to actual opening in each mesh. Bul 905 — The Orville Simpson Company.

Check 1446 opposite last page.

MIX-MULLER

MEANS CONTROLLED DISPERSION FOR DRY SOLIDS:



can save you time and expensive reprocessing

The Simpson Mix-Muller is specifically designed to put you in control of mixed properties. In this era of expensive, high purity materials such a machine can, in one operation, help you eliminate reprocessing, remixing and slash waste and rejects simply by making the most of prepared ingredients.

For these reasons, the rapid increase in the use of the Simpson Mix-Muller has paralleled the increasing availability of better, more uniform and more expensive raw materials.

For similar reasons . . . Mix-Muller usage has paralleled a new, enlightened attitude on mixing practice among processors who have learned that careful attention to mixing operations can be their most important source for savings. Can you afford to settle for less than controlled dispersion?

See our advertisement: CHEMICAL ENGINEERING CATALOG

SIMPSON MIX-MULLER DIVISION **National Engineering Company** 40 Machinery Hall Bidg. • Chicago, Illinois

3 way mulling action coats each grain



... KNEADING

Because the mullers never touch the wearplate, you get an intensive kneading of the muller against material grainsthrough a deep bed of material.



... SMEARING

The inside edges of the wheel have a shorter distance to travel than the outside edges to provide a smearing actionacross the wide face of the mullers.



SPATULATE ACTION

... Note that mullers are set slightly off true radius so that as they roll they also skid sidewards to provide a spatulate action.

... THIS IS CONTROLLED DISPERSION

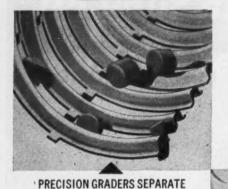


WRITE FOR HANDBOOK

-on mulling. 12-page bulletin explains controlled dispersion-gives details on 9 Mix-Muller models (34 to 60 cu. ft. batch capacity).

Check 1447 opposite last page.

get accurate sizing with SIMON-CARTER machines



MATERIAL BY THICKNESS

For sizing and separating free-

flowing granular materials by

thickness, Carter Precision Graders use revolving cylinders with slotted perforations. Material placed in these cylinders is upedged and presented to the

slots in an edgewise position. The

thinner pieces pass through, and the thicker pieces pass over and are conveyed to the end of the

CARTER GRADERS ALSO SIZE AND SEPARATE BY WIDTH

For width sizing and separating, the Precision Graders use revolving cylinders with round perforations. Material placed in these cylinders is upended and presented to the round perforations in an endwise position. Narrow pieces pass through, and wider pieces pass over for discharge at the end of the cylinder.



CARTER SEPARATORS ASSURE

Carter Disc Separators contain a series of discs, each of which has hundreds of undercut pockets which select or reject materials according to length. As the discs revolve through a mixture of materials, the pockets lift out shorter pieces. Longer pieces, too long to be held in the pockets as they rise, drop away from the discs.

Write today for complete information and descriptive booklets on Simon-Carter machines. Free laboratory testing and demonstrating service.



machine.

SIMON-CARTER CO. 677 19TH AVENUE N.E. MINNEAPOLIS 18, MINNESOTA

Check 1448 opposite last page.



- EXCLUSIVE Span-Jet Nozzles . . . 160° hollow cone spray . . . 180° flat circular spray . . . capacities .75 to 10 GPM
- EXCLUSIVE Tan-Jet Nozzles . . . solid cone spray . . . capacities .50 to 10 GPM
- EXCLUSIVE Simplified, time-saving nozzle selection tables
- PLUS 32 pages of other illustrated industrial spray nozzles, flow chart, spray patterns, spray characteristics and basic engineering data.

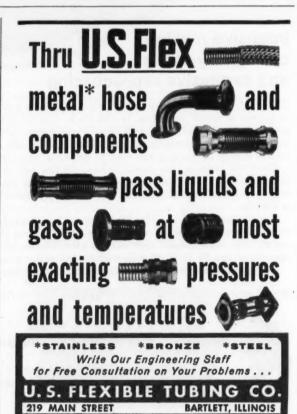
Write for your free copy today.



WM. STEINEN MFG. CO. INDUSTRIAL NOZZLE DIVISION 45-47 Bruen Street, Newark, New Jersey

NDUSTRY FOR MORE THAN FIFTY YEARS

Check 1449 opposite last page.



Check 1450 opposite last page.

PROCESSING EQUIPMENT

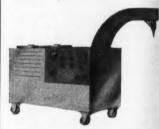
Urethane foam produced at 80 pounds per min by mobile machine

Uses: Producing urethane

Features: Machine has all components mounted integrally as one compact mobile unit. Foam producing capacity ranges from 1/2 to 80 pounds per min.

Description: Compact foam producing machine is mounted on casters for easy mobility. Operation is simple. Personnel can be taught how to run the machine in short time.

As optional equipment, unit can be supplied with portable head which permits dispensing of foam 50 ft away from



Mobile foam-producing machine can be easily moved to point of

metering unit. Either intermittent or continuous delivery of foam is possible. Accurate metering of components is achieved.

(Urethane foam producing machine is product of Rogers Associates Inc., Box 752, West Caldwell, N.J.)

Check 1451 opposite last page.

All-stainless steel parts on low-cost vibrating screen-sifters

Uses: Screening and sifting granular and powdered products.

Features: All metal parts coming into contact with product are made of stainless steel.

Description: Screener operates on eccentric weight principle. Both the amplitude and frequency of vibrations can be changed to obtain optimum conditions.

All normal wear parts of

PROCESSING EQUIPMENT



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All-stainless steel vibrating screener has 20 x 34" single deck screen, is equipped with separate hopper and feed gate

machine are stock commercial items. Except for screen, parts are replaceable from local transmission supply sources which helps minimize downtime and costs. Bearings can be replaced in minutes.

Equipment can be quickly disassembled for cleaning. Available with or without hoppers, machines are produced in wide range of canacities.

(Vibrating screeners are product of Speedex Equipment Co., 57-11 Roosevelt Ave., Woodside 77, L.I., N.Y.)

Check 1452 opposite last page.

Blender is designed to cut expense of mixing jobs

Uses: Blending various solid materials in chemical and allied industries.

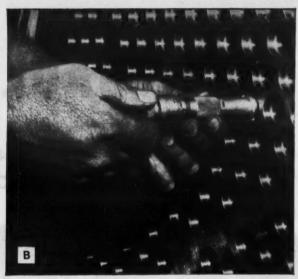
Features: Blender is designed to minimize cost of mixing operations. In addition to low initial price, unit has low power and maintenance requirements.

Description: Blenders are manufactured in either standard or sanitary designs. Units are available with 20 to 200 cu ft capacity. Internal spray lines for liquid addition are optional.

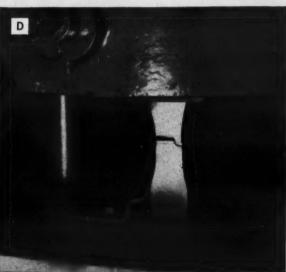
All welded, heavy-duty chamber is equipped with externally-adjusted packing glands. Agitator consists of reversing double-spiral ribbon supported on outboard bearings. Jacketed models are also available.

To next page









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HEAT EXCHANGERS—STEEL AND ALLOY PLATE FABRICATION CONTAINERS AND PRESSURE VESSELS FOR GASES, LIQUIDS AND SOLIDS



Check 1453 opposite last page.



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Harvey Carruthers, Limited
1639 West 5th Avenue
West Martford 7, Conn.
Joseph H. Bertram & Company, inc.
998 Farmington Avenue

PROCESSING EQUIPMENT

From preceding page

Sanitary model has tub coated with vinyl or made of stainless steel. Agitator can be removed for cleaning. Rapid discharge is possible through center discharge with either paddle or drop-bottom gates.

(Ribbon blender is product of Munson Mill Machinery Company, 1000 Seward Ave., Utica, New York.)

Check 1454 opposite last page.

Tower packing is made out of polypropylene

Uses: Tower packing.

Features: Polypropylene Pall ring packing weighs only 4½ lb per cu ft. Rings can be packed to height of 25 ft per plate, resulting in economies in tower support plates and in tower construction.

Description: Polypropylene tower packing combines light weight and chemical resistance with low pressure drop and high mass-transfer effi-



Polypropylene ring tower packing can withstand continuous operating temps to 250°F

ciency. Packing's light weight also makes its use advantageous in fume scrubbing operations, especially where space limitations exist.

Rings are available in four sizes, ranging from % to 2 inch diameter. Units are inert to many organic and inorganic chemicals and can withstand continuous operating temperatures up to 250°F.

(Further information about polypropylene pall rings may be obtained from Process Equipment Div., The U.S. Stoneware Co., Akron 9, Ohio.)

Check 1455 opposite last page.

Try Particle Control in Your

Plant . . . Rent a Gaulin Laboratory Homogenizor for Only \$75.00 Per Month!

This versatile machine reduces

ingredients in your product to ultimate particle size. Minimum

sample one pint; Capacity 15

GPH; Pressures up to 8000 psi.

Rental costs applicable against purchase price. Write for Bulletin LH-55.

NEW LITERATURE

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Processing Equipment

Porous stainless-steel, multiplesurface filters having from five to 720 aq ft operating surface are discussed in eight-page bulletin. Filter elements withstand up to 10,000 psi differential pressure. Bul M-208A — Micro Metallic, a Division of Pall Corporation.

Check 1457 opposite last page.

Electric ovens for applications up to 1300°F and in capacities ranging from one to 36 cu ft are covered in four-page bulletin. Construction details, voltages, and prices are shown. Bul 6950—Blue M Electric Company.

Check 1458 opposite last page.

Self-opening centrifugal separators are covered in four-page bulletin. Diagram of typical unit, design features, and list of industries where equipment may be used is included. "De Laval Model PX"—The De Laval Separator Co. Check 1459 opposite last page.

Processing equipment for fine chemicals, cosmetics, and pharmaceuticals is topic of two-page bulletin. Fourteen pieces of stainless steel equipment designed for continuous operations are pictured. Bul G-581—Cherry-Burrell Corp.

Check 1460 opposite last page.

Packaged dehydration units for cutting moisture content of gases or liquids to low levels are pictured and described in four-page brochure. Selection chart for various applications is also included. But 160-1 — J. F. Pritchard & Co.

Check 1461 opposite last page.

Pigment spray drying is discussed in reprint of technical article. Typical costs of drying organic or morganic pigments are included. Editorial Reprint NYP — Bowen Engineering, Inc.

Check 1462 opposite last page.

Drying principles are reviewed in 32-page book describing vibrating-type coolers and dryers. Both direct and indirect type, electric and mechanical, are depicted. Cat 953— Jeffrey Manufacturing Co.

Check 1463 opposite last page.

Wet-type scrubbing systems to control dust, fumes, and mists are summarized in four-page bulletin. Drawings depict typical installations. Fully equipped pilot plant unit is also described. Bul 957—Automotive Rubber Co., Inc.

Check 1464 opposite last page.

sharp

AMERICAN BI - METAL THERMOMETERS make accurate temperature readings sharp and sure at all check points



American Dial Thermometers are also available in mercury, vapor pressure, and gas actuation . . . on-the-spot and distant reading types . . . in sizes, ranges and stem lengths to meet your most exacting requirements.

sensitive

Any way you look at an American Bi-Metal Thermometer, you see exact working temperatures.

The two-level "Maxivision®" dial eliminates parallax effects. Numerals are on the lower level. Graduations are on the outer raised ring dial which presents a sheared edge to the tip of the pointer and in the same plane. To make readability even more accurate, the glass and graduated dial are closely spaced.

American Bi-Metal Thermometers are made of weather-proof stainless steel. All joints are

welded to solid unity, then polished smooth so corrosion won't build up and destroy the thermometer's usefulness. And, you don't have to discard this thermometer even if the glass is ever broken. The bayonet lock bezel makes replacement easy.

Learn about the high sustained accuracy and long service life built into American Bi-Metal Thermometers. Phone your nearby industrial supply distributor for help in selecting the right type for each temperature check point in your plant. Or write for Catalog 100A.



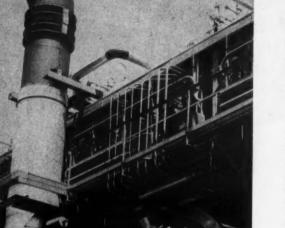
AMERICAN INDUSTRIAL THERMOMETERS A product of MANNING, MAXWELL & MOORE, INC.

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Check 1245 opposite last page.

JUMBO EXPANSION JOINTS

Thermal expansion of piping caused by high temperatures of butane dehydrogenation process controlled by more than 100 special expansion joints



PROBLEM: To design a compact, reliable piping-expansion joint system for the 50,000-ton per year butadiene production plant of Odessa Butadiene Co. at Odessa, Texas.

System includes a total of eight Houdry Process catalytic reactors. At any given time in operating cycle, three are on the dehydrogenation cycle in which normal butane and recycled butylenes are passed over a chrome-alumina catalyst at 1100 F under vacuum conditions. Three others are on hot air regeneration of catalyst, and remaining two

are on steam purge, reducing cycle, evacuation, or valve switching.

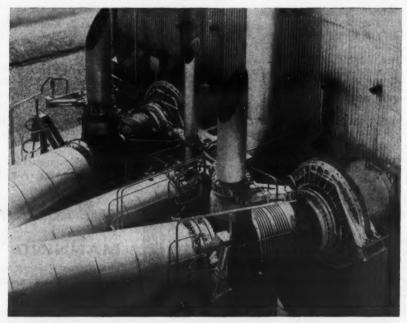
Reactors are interconnected by five continuous stainless steel headers, ranging in size from 18 to 60" diameter and designed to operate at 1200°F under vacuum or pressures as high as 45 psig. In addition to the main headers carrying feed, product, regeneration air and evacuation exhaust, it was necessary to tie in other equipment such as quench towers, compressors and a waste heat boiler in locations remote from the reactor bank with lines as large as 72" diameter.

Space limitations and flow considerations made compact, straight runs a necessity. Hightemperature operation required minimum loading on sensitive equipment. Openair construction with few or no load-carrying structural members in many locations, together with the necessity for supporting pipe weight and resisting wind loading, dictated maximum stability of expansion joints with minimum use of external guides and anchors.

Solution: Process, piping and structural engineers from company that designed plant,

Fig 1—Front view of 54"-diameter product header shows stotted hinged expansion joints (under weather hoods) and hinged loop to pre-quench tower in left foreground. Note single spring support and guide, rugged hinges and attachment structures for loads greater than 50 tons

Fig 2—Special features of 48"-diameter expansion joints at compressor discharge include double bellow for large axial movement, and internal guide sleeve for stability and minimum pressure drop



PROTECT PETROCHEMICAL PLANT

together with application engineers from expansion joint manufacturer, worked with models to visualize the problems. Expansion joints were thus located, selected and designed, equipment was located, and anchor, guide and support locations were pinpointed for all major components in little more than one week.

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Because of relatively severe operating conditions, special non-equalizing type expansion joints were chosen for all lines. Use of this type of expansion joint, with no external reinforcement on the corrugations, provides for minimum weight and cost. Savings were significant since, at the indicated operating temperature, reinforcements would have

had to be alloy construction.

Bellows (flexing elements) of all expansion joints were hydraulically formed to provide the smooth continuity of shape and uniform thickness required to eliminate stress concentrations and in sure maximum reliability. Titanium-stabilized 321 stainless steel was used for all bellows to reduce the danger of carbide precipitation at the high operating temperatures.

Internal stainless steel sleeves were incorporated on all expansion joints subject to high-velocity flow to reduce the possibility of turbulence with the attendent problems of pressure drop and vibration. For maximum economy, expansion joints were tied and

guided, insofar as possible, to eliminate the need for complex structures external to the expansion joints.

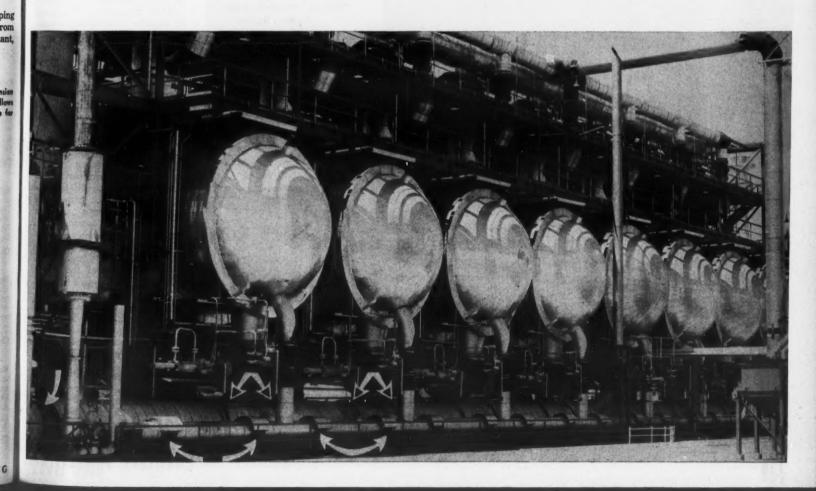
It was necessary to accommodate not only axial growth of the five main headers, each approximately 200' long, but also the movement of reactors and their connecting branches. To provide complete operating flexibility, allowance was made for one of any two adjacent reactors to be operating while the other was on standby.

Similar arrangements were made for all headers, with two slotted-hinged type expansion joints installed between each pair of reactor branches (Fig 3). Acting in pairs, these joints are capable of relieving all thermal movement in the

headers and reactors. Slotted hinges enable expansion joints to carry the weight of piping between them and to resist deformation due to wind loading. All parts of these expansion joints, including the hinges, are constructed of stainless steel.

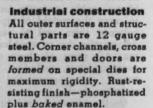
On the various branch lines,

Fig 3—End view of reactor bank at Odessa Butadiene shows 18"-diameter evacuation and 60" regeneration air headers below reactors, and 24" feed header above reactors with three-hinged branch to heater. Note slotted hinged expansion joint at left without weather hood, and uniform, compact arrangement of similar expansion joints in all headers (see



Don't Price Yourself Out of the PLUS Features You Get with SQUARE D CONTROL CENTERS





Saves space

Unit heights in 3-inch increments-an exclusive Square D advantage which permits use of units with minimum heights. eliminates the wasted space typical of modular systems.

Built-in safety

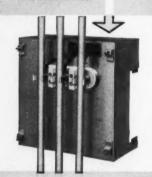
Units are metal-enclosed to confine damage should a fault occur. Unit side plates are permanently attached-can't be accidentally discarded. Switch-type units have visible blade disconnects for added safety.

Extra control flexibility

A variety of removable panels accommodates up to four oil-tight push buttons and pilot lights.

Tubular vertical buses

Another Square D "exclusive" - inherently stronger-greater cooling surface. Extra-wide spacing between phases gives added "breakdown" protection. Plugin stabs are silver-plated copper backed by steel springs - give high pressure low resistance contact at all times.



GET THE COMPLETE STORY

BULLETIN SM-244 gives detailed informa-tion on all of the "plus" advantages you get when you specify Square D motor control centers. Send for a copy. Square D Company, 4041 North Richards St., Milwaukee 12, Wis.

Liberal wiring space Wiring channels are large and accessible. No wire fishing through narrow passageways - wires can be laid in position — less costly installation.



SQUARE 🕇 COMPANY

wherever electricity is distributed and controlled

Check 1465 opposite last page.

PETROCHEMICALS

systems of three hinged joints were selected to provide max. imum flexibility of the complex piping with maximum stability. In most cases, only one external support-guide was required on each such branch (Fig 1). Rising from ground level to tower connections more than 60' above grade, these three hinged systems permitted piping offsets to provide truck and workway clearance.

While most of the expansion joints on the project are of the hinged or slotted-hinged type, different techniques were needed to solve special problems. Regeneration air is furnished by one large compressor and two gas turbines. It was essential that these machines be protected from the massive thermal reactions generated in the piping, but due to the extremely critical flow conditions at the discharge, the piping configuration was narrowly limited.

This was overcome by using two 48"-diameter doublebellows expansion joints (Fig 2) capable of absorbing a large amount of axial compression in a limited length. Segment of piping shown in the photograph was isolated by anchors from the balance of the system to prevent the action of pressure thrust on the equipment. Prequench and quench towers had to be interconnected with an opening more than 7' in diameter. Locations of these towers were fixed by foundation requirements and the distance between them is relatively small. Since the opening is some distance above the tower support level, and since the towers operate at different temperatures, the expansion joint is required to absorb both axial movement and the differential vertical growth of the two towers.

An 851/2" diam nonequalizing type expansion joint was designed to accommodate all of the necessary movement within the limited length available (Fig 4). In order to withstand the pressure reaction, the tower openings were reinforced with special saddles, and pin-ended tie bars (arrow) installed at the expansion joint elevation.

PETROCHEMICALS

Results: Due to the combination of high temperatures, large diameters, stiff piping and critical flow considerations, the construction of a unit of this scope would be inconceivable without the use

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Fig 4—Pinned structural ties (arrow) on 85½"-diameter expansion joint connecting quench and pre-quench towers permits expansion joint to absorb axial movement and differential vertical movement without excessive load on towers

of expansion joints to absorb movement and protect equipment.

The use of approximately 125 specially engineered and designed expansion joints permits containment of this efficient, high production unit in an area whose largest dimension is a few hundred feet. Even if an infinite amount of low cost land were available, the additional costs involved in the use of piping flexibility alone, including additional pipe and structures, additional power to overcome pressure drop, and increased operating costs would quickly prove prohibitive.

Thus, the very existence of this plant, to say nothing of its two year record of successful operation, clearly illustrates the effectiveness of bellows type expansion joints in controlling thermal expansion under critical service conditions.

(Expansion joints are product of Zallea Brothers, Taylor and Locust St., Wilmington 99, Delaware.)

Check 1466 opposite last page.

(Plant was designed by Fluor Corporation, 2500 S. Atlantic Blvd., Los Angeles 22, Calif.)

See why ALCOA ALUMINUM makes a good design habit

Requirement: A low-cost material able to stand up at temperatures below $-190^{\circ}F$

Key to good design: Specify Alcoa Aluminum for piping and equipment in the cryogenic range

When process temperatures reach levels below 0°F, aluminum becomes easily the most satisfactory metal for process equipment and piping. Many materials undergo pronounced changes in physical structure at these temperatures. In most cases, the result is substantial deterioration in the material's serviceability. The reverse is true with aluminum, however.

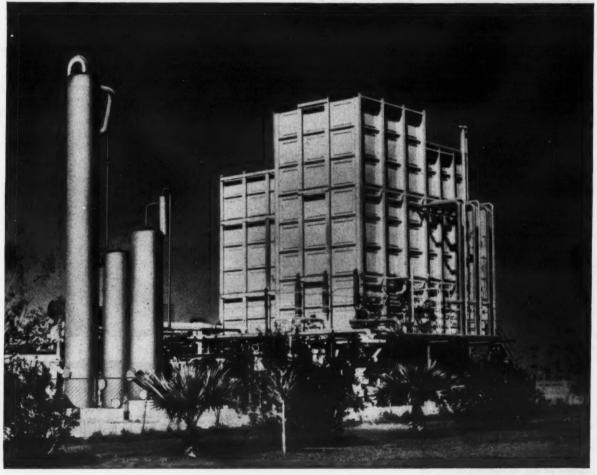
Aluminum alloys actually display significant improvement in major mechanical properties as operating temperatures drop past 0°F to -300°F and below. For instance, tensile, shear and fatigue strengths of aluminum alloys increase with a decline in temperature.

Operating experience in actual applications has proved

the stamina of aluminum in such varied cryogenic applications as these: tonnage oxygen production . . . low temperature recovery of hydrogen from refinery gases . . . methane liquefaction, storage and transportation . . . air enrichment for steelmaking. You will find a number of aluminum uses in these and other applications described on the following pages.

One other fact deserves major consideration in evaluating the cryogenic applications of aluminum. It is the surprisingly low initial cost of the light metal. In most instances, aluminum has proved to be far and away the most economical material able to serve satisfactorily in a wide variety of cryogenic operations.

Oxygen Plant for production of synthetic organic chemicals. Photo courtesy Air Products, Inc.



Check 1467 opposite last page.

Pressure indicator can also transmit to recorder

Uses: For low- to mediumpressure measurement of air or non-corrosive gases.

Features: Transmitter can be located to provide pressure indication at point of measurement (or within 300') on an easy-to-read dial. In addition, same unit can simultaneously



Flexible pressure transmitter

transmit pressure measurement electrically to a remotelocated recorder or indicator.

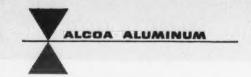
Description: In operation, variations of pressure or pressure differential produce movement of sensing element, which moves indicating pointer and core of a differential transformer. This core movement is exactly matched by circuit-balancing movement of differential transfer core in remote-located recorder or indicator.

(Model 231 indicating transmitter is product of The Hays Corporation, Michigan City, Ind.)

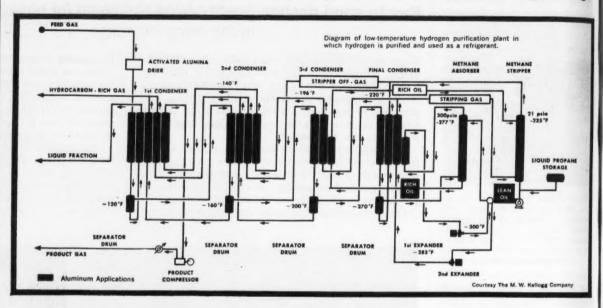
Check 1468 opposite last page.

Gas-density detector for chromatographs determines MW

Gas-density detector for chromatography units has been designed by Standard Oil Company (Indiana). Detector measures the molar weight of gas, permitting chromatographic peaks to be con-



Aluminum's tensile and yield strengths go up





Because aluminum shows no embrittlement at low temperatures, it enjoys wide use in hydrogen purification plants such as the one shown above.

Aluminum has proved extremely effective for transport piping and tankage in the handling and storage of liquid methane. It is also being used in insulated cargo tanks aboard ship for overseas transport of liquid methane.

Photo courtesy Constock International Methans, Ltd.

This low pressure air separation tower is typical of aluminum equipment now finding broad use in cryogenic operations in the petrochemical field.

Photo courtesy Project Fabrication Corp.



See why ALCOA ALUMINUM makes a good design habit

as the temperature goes down



The light weight of aluminum, added to its low temperature performance, makes for easy, effective handling and storage of liquid nitrogen in this 600-liter container tabricated of Alcoa Aluminum Alloy 5154.

In the chart below, you see results of tensile tests on various aluminum alloys at temperatures ranging from 75°F to -423°F. Note that at -320°F tensile strengths average 35-50 per cent higher than at room temperature, yield strengths 15-25 per cent higher. Temperature drop also brings about increases in elongation. And you will notice that there is no undesirable loss in reduction-of-area.

Here, you see evidence of the outstanding low temperature mechanical properties which, coupled with low cost, make aluminum synonymous with efficient, economical design for cryogenic equipment.

Results of Tensile Tests of Some Aluminum Alloys at Subzero Temperatures

Temp.,	Alley and Temper	Tensile Strength, psi	Yield Strength,* psi	Elong. in 48,	Red. of Area, %	Alley and Temper	Tensile Strengti psi	Yield Strengti psi	Eiong in 40	Red. of Area,	Alloy and Temper	Tensile Strengt psi	e Yield h, Strength psi	elong. in 40,	Red. of Area, %
75	3003-0	15,600	6,000	43.0	81	5154-0	35,200	17,100	28.8	66	5356-0	42,100	0 19,200	30.0	54
_ 18		15,600	6,100	44.0	81		35,400	16,600	31.5	72		42,800			65
-112		19,000	7,300	45.0	80		36,500	17,200	35.0	73		43,300	0 19,700	33.5	66
_320		32,300	8,600	48.8	76		51,200	19,600	41.6	60	1	61,300	22,200	42.5	48
75	3003-H14	23,200	21,500	14.0	54	5154-Н3	2 41,900			61	5356-H32	46,300			54
- 18		24,000	21,900	15.0	58		43,000	31,900	22.0	68		46,600			62
-112		25,600	22,300	18.5	59		44,300	32,600	25.3	68	1	47,500			64
-320		36,600	25,900	32.5	56		62,300	37,400	34.0	53		63,90	0 37,100	34.0	53
75	3003-H18	30,400	26,700	9.0	34	5154-H3	4 43,800	34,600	17.0	55	5356-H34	53,200			51
- 18		32,000	28,000	8.0	· 37		44,000	34,600	19.8	62		53,900	1		55
-112		33,400	29,300	11.0	44		45,300	35,400	20.5	64		55,100	41,200	21.0	58
_320		42,800	33,400	23.0	46		55,800	39,800	23.0	58		73,400	47,100	27.5	43
75	5052-0	29,100	14,300	33.2	72	5154-H3	8 50,400	42,100	14.2	45	5083-0	45,400	21,800	23.0	35
- 18		29,200	14,400	35.8	74		51,000	42,300	16.9	55		46,700	21,000	24.5	39
-112		30,600	14,300	40.8	76		52,200	43,800	19.8	56		47,000	21,200	27.0	47
-320		44,800	16,800	50.0	69		67,400	49,900	24.4	48		62,900	23,800	33.0	38
75	5052-H32	32,200	24,400	21.7	72	5086-0	36,600	16,000	32.0	55	5083-H11	3 49,800			29
- 18		32,900	24,100	22.9	73		36,400	16,600	32.0	60		51,000	38,700		37
-112		34,800	24,300	26.3	74	1	37,100	15,600	36.0	62		52,100	42,200	19.0	40
_320		50,700	28,400	37.7	64		52,400	17,000	49.0	52		67,800	48,400	25.0	36
75	5052-H34	38,500	31,200	17.4	58	5086-H3	43,300	31,100	16.0	27	5456-0	50,800		20.0	26
18		38,800	30,600	18.8	62		45,200		18.0	38		49,900		22.5	34
-112		40,700	31,800	21.0	60		46,900	32,200	23.0			49,700		25.5	41
-320		55,400	37,100	29.7	56		64,400	37,300	30.0	35		66,000	26,800	30.0	33
75	5052-H38	40,100	34,200	16.6	59	5454-H3			16.0		5456-H32			12.0	16
- 18		40,700	33,800	18.3	63		44,100	1	19.0	38		57,600		13.5	19
-112		42,400	34,300	20.6	64		45,500		22.5	44		57,500	39,200	17.0	27
320		57,900	39,800	30.9	57		63,200	35,700	31.0	35		74,100	45,400	22.5	21
75 18	6061-T6	44,300 46,100	38,200 38,700	19.8 19.0	50 50	Yemp.,	Alley and Temper	Tensile Strength, P.S.I.	Yield Strength, P.S.I.	Elongation in 2 in.	Tomp.,	Alloy and Tomper	Tensile Strength, P.S.I.	Yield Strength, P.S.I.	Elongation in 2 in.
-112		48,100	40,200	20.0	50				20.500				44.000	40.000	100
-320		59,200	45,000	24.6	46	100	5456-H321	57,400	39,500	14.5	75	6061-T6	44,900	40,800	13.8
						-320	500	76,600	47,200	26.8	_320	SAUE 1	61,000	48,600	23.3
	-					-423	A TANK	94,500	51,500	15.6	-423	-	75,800	55,300	18.3

* Offset = 0.

Specimens of special design, courtesy of Lewis Research Center, N.A.S.A.

Check 1467 opposite last page.

verted directly to weigh %.

Detector does not require calibration, is linear across broad ranges of concentration and does not use expensive or scarce carrier gases. Nitrogen eluting gas is used.

Measurements are closely comparable to those from thermal conductivity cells. Precision and accuracy are excellent. Gas flow and electrical connections, as well as circuitry, power supplies and recorder ranges, are identical with those now used in many standard chromatographs.

(Gas-density detector is product of Gow-Mac Instrument Co., Madison, N.J.)

Check 1469 opposite last page.

Floating roof tank has 312,000 bbl capacity

Floating-roof tank, believed to be the world's largest, was recently placed in operation, at Kawasaki, Japan, near Tokyo. Tank, which has a capacity of 312,000 bbl, is 210' in diameter and 54' high. It is used for storage of gasoline.



Small dot just to left of center of tank is a man ascending stair-

Tank is equipped with Tubeseal system, which assures positive protection against evaporative losses and product contamination by eliminating space where airvapor mixtures can form.

(Tank was constructed by Pittsburgh-Des Moines Steel Company, Neville Island, Pittsburgh 25, Pa.)

Check 1470 opposite last page.

(Tubeseal system is development of Hammond Iron Works, 744 Broad St., Newark, New Jersey.)

Check 1471 opposite last page.

The low temperature ductility of aluminum made it practical to construct this entire oxygen plant of aluminum. The harp-type heat exchangers at the left are dip-brazed assemblies which contain thousands of tiny fins for maximum heat transfer. The structural utility of aluminum may be inferred from the fact that the tower at the right extends some 100 ft,



ALCOA has devoted over 40 years to a careful exploration of the uses for aluminum in the process industries. This experience has developed a substantial body of factual data related to the performance of aluminum. That information is yours for the asking. Simply describe your problem as clearly as possible in a letter to the address indicated on the coupon below. For free copies of available literature, simply fill in and mail this coupon.

In 1960, Alcoa will continue to conduct its annual series of engineering conferences relating to process industries applications of aluminum. Your nearest Alcoa sales office will furnish details.

World wide sales through ALCOA INTERNATIONAL, INC., 230 Park Avenue, New York 17, New York.

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		drama co	MPANY OF AM	IRICA
	Emmy	ery Tuesday, C-TV, and the Award winning COA THEATRE	S"	
The second second	arternate	Mondays, Milk	4	

Aluminum Company of America, 872-D Alcoa Building, Pittsburgh 19, Pennsylvania.

Please send me the following literature covering Alcoa Aluminum uses in the process industries:

- ☐ 11251 Cryogenic Applications of Alcoa Aluminum☐ 10197 Aluminum Pipe and Fittings☐ 10418 Alcoa Unitrace: Combines Piping and Tracing in
- One Unit

 10270 Alcoa Utilitube
- □ 10460 Process Industries Applications of Alcoa

Address

City

State

- ☐ 10508 Cleaning and Maintenance
- 20849 Resistance of Aluminum Alloys to Weathering and Resistance of Aluminum Alloys to Chemically Contaminated Atmospheres

 20265 Have You Tried Aluminum in Your Refinery?
- ☐ 20935 Designing to Prevent Corrosion
- ☐ GL-86C Unfired Pressure Vessels of Aluminum Alloys
 ☐ 20437 Aluminum Alloy Heat Exchangers in the Process
- DD508 Aluminum Alloys in Tank Trucks and Tank
- Trailers
- 10387 Alcoa Standard Storage Tanks
- 20272 Aluminum Alloys for Handling High Purity Water 21090 Resistance of Aluminum Alloys to Fresh Waters 19416 Brazing Alcoa Aluminum
- 10415 Welding Alcoa Aluminum 19051 Alcoa Aluminum Handbo

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mpany	

Uses: For control of liquid flow and proportioning.

Features: Construction of pump eliminates need for variable-speed drive.

Check 1467 opposite last page.

PETROCHEMICALS

Couple data processing and data handling equipment

Uses: Input machine allows variable data entry and record creation for computer data processing, elements of data collection, creation of media for automatic control device input and other applications.

Output unit creates a permanent record of complete exception data for process in-



Electronic unit prints characters serially

dustry variables such as volume, pressure and temperature. Other applications include logging of laboratory results and production variables such as shaft rotation, weight and quantities.

Features: Units, which print characters serially, provide the man-machine coupling to data processing and data han-

dling equipment. Description: Electronic data input and output machines are capable of discrete line or binary connection to basic data handling unit or media creation equipment. Both alpha-numeric and numericonly printout are available.

(Codewriter is product of Industrial Products Div., Royal McBee, 740 N. Main Street, West Hartford 17, Conn.)

Check 1472 opposite last page

Zone

PETROCHEMICALS

Description: Pump employs an eccentric cylinder liner with sliding vanes that can be adjusted to change effective displacement of pump. Dial on

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Pump can be used for blending operations

unit operates a pinion and rack which rotates the cylinder liner.

This construction permits variation of delivery from zero to full capacity while running at constant speed. Without changing rotation, it can reverse its flow to evacuate discharge lines after shutoff. Pump can proportion two or more liquids in accurate ratio. (Vari-Flo pump is product of Blackmer Pump Co., Grand Rapids, Mich.)

Check 1473 opposite last page.



"Page 62—rule 294 for all supervisors in the new union contract."



What's so special about the huge fractionating tower shown here? It is one more example of how Sun Ship builds and delivers heavy industrial equipment on barges or sea-going vessels, with careful attention to such requirements as safety and on-time schedule.

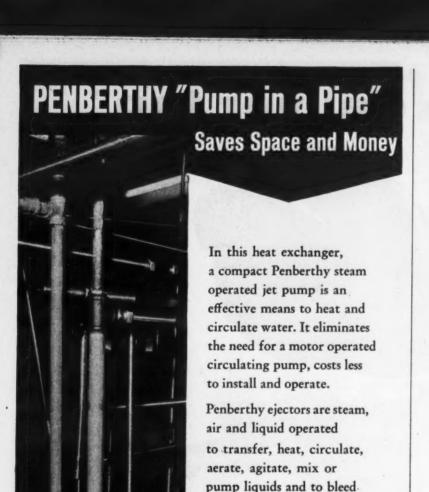
Whether it's a fractionating tower or key structural part for industry, transporting big items by water or by rail is strictly routine for Sun Ship, for we build and deliver what's needed in many fields. If you have a machinery or heavy equipment problem, write to us about it.

Sun

SHIPBUILDING & DRY DOCK COMPANY

ON THE DELAWARE . SINCE 1916 . CHESTER, PA.

Check 1474 opposite last page.



Available in bronze, iron, stainless steel, plastic and other materials. Standard and custom made.

and exhaust air or vapor and

to produce vacuum.



PENBERTHY MANUFACTURING COMPANY

Division of Buffalo-Eclipse Corporation

PROPHETSTOWN

There's Certain satisfaction

in PRODUCTS BY



EJECTORSINJECTORS

CYCLING JET PUMPS

ELECTRIC SUMP PUMPS

Check 1475 opposite last page.

PETROCHEMICALS

Example of smooth processing operation in CRYOGENICS field provided by air separation unit and nitrogen scrubber, operating at temperatures to -320°F as they -

Furnish high-purity synthesis gas for 180 ton/day ammonia plant

GORDON WEYERMULLER Petrochemical Editor

RYOGENICS - operation of equipment at extremely low temperatures - requires considerable engineering to provide continuous and trouble-free operation. Airseparation unit and nitrogen scrubber, used in an 180 ton/ day ammonia plant have operated with a minimum of difficulty since plant went on stream in March 1958.

According to processing engineer in charge of plant, two cold boxes and their accompanying equipment have worked fine, requiring little operator attention and practically no maintenance. Air separation unit has operated consistently over design rate.

Nitrogen produced in air separation unit contains less than 40 ppm oxygen. Ammonia synthesis gas formed from this nitrogen and hydrogen from scrubbing unit contains less than 20 ppm of carbon monoxide plus oxygen and less than 250 ppm argon.

Air Separation Unit

This unit uses a standard medium-pressure air-separation cycle at 150-160 psi. Air is first purified by removing carbon dioxide, then prechilled to about 40°F. It is dried to -90°F dewpoint before it enters cold box.

Two towers are used to liquefy and fractionate the air. Overhead from first tower is 99% nitrogen and bottoms is 50-50 nitrogen and oxygen.

Overhead from first tower goes to second tower as reflux. Bottoms from first tower is charged to second tower. Overhead from second tower is high-purity nitrogen. Bottoms, which is 99% oxygen, is vented to air. Another stream vented off from this column contains argon.

Air-separation unit is equipped with two sets of silica gel filters for removing hydrocarbon contaminants. Liquid is continuously purged from unit to prevent buildup of contaminants. Liquid oxygen is continuously monitored for hydrocarbons. Air-separation unit utilizes two vertical oxygen pumps.

Refrigeration is supplied for air-separation unit by two Stratos turbines, which operate at a speed of 14,000-15,000 rpm. Pressure drops from 120 to 70-80 psi. Temperature of air drops to -230 to -260°F and then expands into tower at -320°F.

Air-separation unit handles 325,000 std cu ft of air/hr. About 75% is converted to nitrogen.

Hydrogen Purification Unit

Raw material for this unit is reformer gas from adjacent refinery. Nitrogen scrubbing



Nitrogen cold wash box in a petrochemical plant

unit had to be flexible enough in design so that any combination of five available feedstocks, varying in content as shown, could be processed:

of

ing its. ged lup

> H₂ 74.0 to 93.0% CO 0.1 to 2.0 CH₄ 1.6 to 13.0 C₂ 2.2 to 7.5

Incoming gas is dried to -90°F dewpoint and cooled by exchange with products leaving plant and by ethylene. Light hydrocarbon stream is condensed out at -60 and -150°F in two steps.

With further cooling, first fuel gas is condensed at -250°F, being completely removed as temperature drops to -275°F. Gases then pass to scrubbing tower and liquid nitrogen at 2650 psia is used as medium to remove methane at -315 to -320°F.

Nitrogen is flashed. Bottoms - consisting of liquid meth-

ane-nitrogen mixture, with 5-10% H_2 — is discarded, refrigeration being recovered before discharging to flare.

Nitrogen and hydrogen mixture is taken overhead, with refrigeration also being recovered from this stream. A third-stage nitrogen at 375 psig is used for trim blending. Synthesis gas is compressed and goes to ammonia converter.

Nitrogen scrubber handles 600,000 std cu ft of gas/hr. Total pressure drop on feed gas as it passes through complete nitrogen scrubber is only 20 psi. Scrubber contains no moving parts.

(Air-separation and nitrogen scrubbing units were designed and built by American Air Liquide Inc., 405 Lexington Ave., New York 17, N.Y.)

Check 1476 opposite last page.





METERING ACCURACY OF ±1% CAPACITY TO 1624 GPH.

New 200 Series Simplex model can pump up to 812 gph. Duplex model has double this capacity. Maximum pressure of 10,000 psi.

Easy, inexpensive operation is assured by these quality features:

- Self-contained lubrication system no downtime for lubrication.
- E-Z Clean Cartridge Valves simplify maintenance.
- Interchangeable liquid ends for greatest adaptability in the field.
- Precision screw adjustment on crank for easy accurate stroke regulation.
- Sealed Self-aligning bearings on crank and crosshead withstand greater radial and axial thrust loads.
- · Crossheads of hardened and ground steel ride on cast iron.
- · Heavy duty reducers.
- NEMA frame motors.

Precision built 200 Series pumps handle a wide variety of "tough," corrosive materials. In Chemical Processing, Refining and Boiler Feed operations, the pumps assure highest accuracy in feeding precisely metered fluids in virtually all ratios, with flow, temperature, pressure, conductivity, PH and other controlled process variables.

Write today for more information.



Check 1477 opposite last page.

This metering pump has NO STUFFING BOX

Lapp PULSAFEEDER

CONTROLLED-VOLUME CHEMICAL PUMP

Prevents Costly
Leakage and Contamination

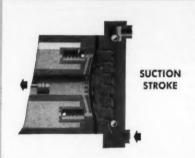
Lapp Pulsafeeder is a piston-diaphragm pump having a hydraulically balanced diaphragm and a closed hydraulic system. Its reciprocating piston action provides accuracy of positive displacement while the diaphragm isolates liquid being pumped from the pump's working parts. Eliminates need for stuffing box or running seal . . . prevents product leakage and contamination. Maintenance costs, too, are reduced to next to nothing. There are practically no repairs or replacement parts.

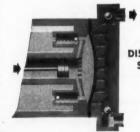
All Pulsafeeder pump parts contacting liquid are of special corrosion-resistant materials. Pumping speed is constant; variable flow results from variation in piston-stroke length, controlled manually by hand-wheel, or, in auto-pneumatic models, by instrument air pressure responding to any instrument-measurable processing variable. Pulsafeeder capacities range from 585 ML per hour up to 24 gpm maximum flow and pressures from minus atmospheric to 6800 psig.

WRITE FOR BULLETIN 59 containing typical applications, flow charts, description and specifications

of models of various capacities and constructions and special leakage chart. Lapp Insulator Co., Inc., Process Equipment Division, 3515 Poplar St., Le Roy, New York.







DISCHARGE STROKE

Check 1478 opposite last page.

PETROCHEMICALS

Lightweight check valve easily installed

Check valve, which is much lighter than conventional valves, provides easy installation and low maintenance. The 4" size is only 2\%" long and the 12" size is only 6\%" long. Check valve can be installed between regular flanges in line, requiring only slightly longer flange bolts to bridge length of valve.

Synthetic seal prevents seepage at pressures as low as



Check valve uses synthetic seals that prevent leakage at low pressures

2 or 3 psi. Sealing material is molded into a metal groove, making an O-ring seal.

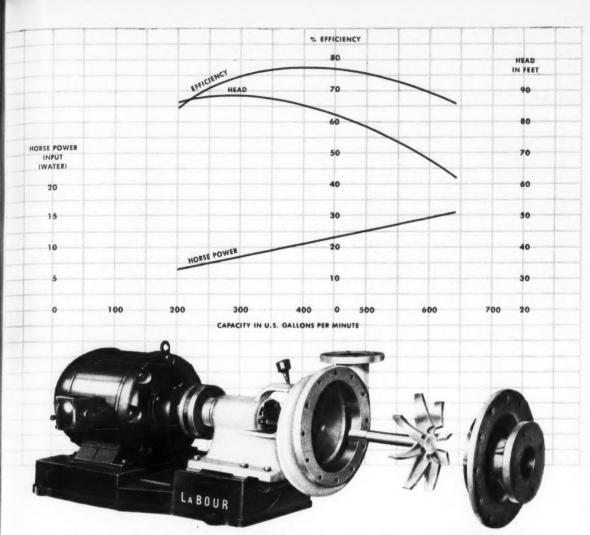
Anti-slam spring closure seals positively, yet opens with only ounces of pressure on upstream side. No load is carried on plate hinges at any time. There are no external parts and no lubrication is required.

(Duo-Chek valve is product of Mission Valve and Pump Company, subsidiary of the Mission Manufacturing Company, Post Office Box 42%, 5208 Jensen Drive, Houston 10, Texas.)

Check 1479 opposite last page.

NEXT MONTH

Features of the Pechiney-Grace total recycle urea process which have made it an outstanding success at the W. R. Grace Memphis plant will be described in a major article in the U.S. and World Petrochemicals section.



And it's done with an OPEN IMPELLER

There's no need to give up the many advantages of open impeller pumps for chemical service, in order to obtain higher efficiency. This curve, the actual record of a LaBour No. 20 Type SQ pump, is typical.

Because the performance of a LaBour pump is not dependent upon close clearances inside the casing, substantial increases in clearances have little effect. That's why, even after long, hard service, LaBour pumps continue to deliver relatively high efficiency.

We'll be glad to explain why it's to your advantage to insist on fully open impellers, and to insist on LaBour pumps for efficiency without sacrifice of those advantages. Write us today.

ORIGINAL MANUFACTURERS OF THE SELF PRIMING CENTRIFUGAL PUMP

LABOUR

THE LOBOUR COMPANY, INC.

ELKHART, INDIANA, U.S.A.

Check 1480 opposite last page.



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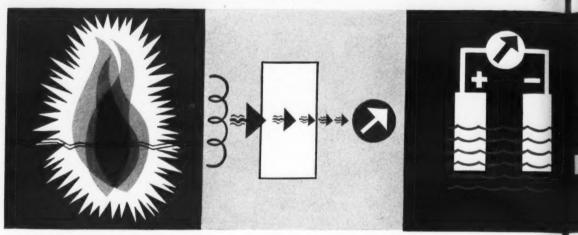
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MSA Instruments apply all these principle



Catalytic Combustion

Infrared Analysis

Depolarization



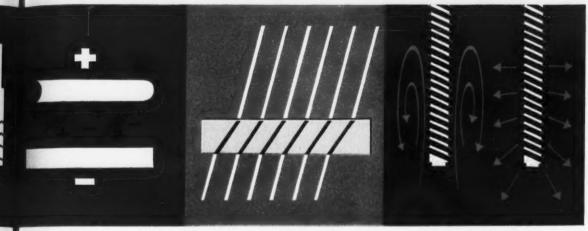
INSTRUMENT DIVISION

Mine Safety Appliances Company

Pittsburgh 8, Pennsylvania

1. M-S-A* LIRA* Infrared Analyzer Model 200 2. M-S-A* LIRA* Infrared Analyzer Model 300 3. M-S-A* Gas Analyzer 4. M-S-A* Combustible Gas Analyzer 5. M-S-A* Thermatron Analyzer 6. M-S-A* Onlocator 7. M-S-A* Water Vapor Recorder 8. M-S-A* BillionAire* Analyzer 9. M-S-A* Process Refroem

pler dependable process stream analysis



Ionization

Refraction: Now MSA packages the principle of light refraction for continuous measurement of organic and inorganic liquids.

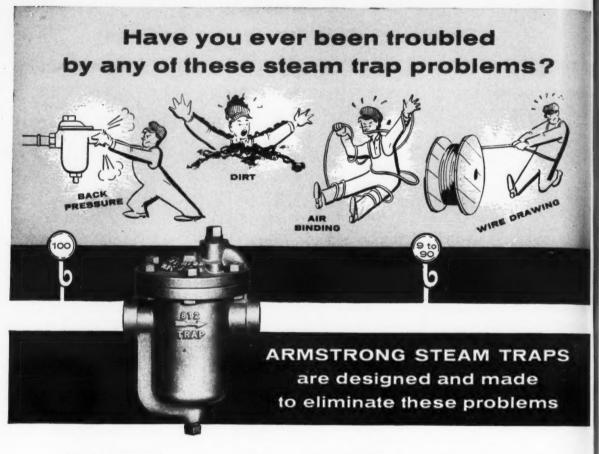
The new M-S-A® Process Refractometer shown below, compares the refractive index of a stream with a constant standard. Controls quality in either stream or batch processes. Converts to new problems quickly and easily.

MSA has been supplying industry with similar "brains" for gas analysis since 1922. So, we're not newcomers. Our people are competent professionals. And so are our instruments. Both are extremely articulate when it comes to process stream analysis.

There are many MSA approaches to measuring gas concentrations. From the simplest to the most sophisticated. Most of these approaches stem from the principles symbolized above. Write us for instrument literature on the new M-S-A Process Refractometer or any of our other process stream analyzers.



Thermal Properties



BACK PRESSURE ... Armstrong Traps operate on any back pressure—or vacuum, for that matter. As long as there is a pressure differential across the trap, it will close on steam and open for condensate. Even the high back pressure caused by blow through of one or more traps in the system will not disturb Armstrong Traps. Other than a reduction in capacity, Armstrong Traps are unaffected by back pressure.

DIRT . . . Armstrong Traps are not affected by ordinary dirt. When the trap opens condensate swirls down under the edge of the bucket and up through the discharge orifice. Dirt is kept in suspension and discharged along with the condensate. For very bad dirt conditions, Armstrong offers traps with integral strainers. These cost less than a trap plus a separate strainer.

AIR BINDING . . . Armstrong Traps cannot air bind. Air in the system passes through a vent in the top of the bucket. It collects in the top of the trap and is discharged with the condensate. There is no chance for it to stop the trap. For low pressure on-and-off units where large amounts of air accumulate while the steam is off, Armstrong offers open float and thermostatic air vent traps in a complete range of sizes.

WIRE DRAWING . . . Armstrong Traps are designed and made to resist wire drawing. The valve and seat are tough stainless steel. The valve opens and closes tightly with a fast action and is always water sealed. There is virtually no chance for grit or sediment to lodge in the valve, virtually no chance to create conditions that lead to wire drawing.

There's no need to accept any of these problems as "inevitable." Your local Armstrong Representative can show you how to end them all. Call him today or write direct,





low pressure heating service.



800 Series, side inlet,



No. 801, side inlet,



80 Series, integral



200 Series, bottom inlet, top outlet.



Forged Steel Series, for high pressure

The 48 page Armstrong Steam Trap Book tells how to correctly size, install and maintain steam traps for any pressure, any temperature, any load plus full catalog data on Armstrong Steam Traps. Ask for Catalog K.



ARMSTRONG MACHINE WORKS

8804 Maple Street Three Rivers, Michigan

See Our Catalog in Chemical Engineering Catalog

Less than 10 milliseconds response time of DC voltage sensor

Uses: Voltage sensor can also be used as a voltage comparator, with suitable reference voltage.

Features: Device is fast acting, with less than 10 milliseconds response time. It will maintain operating level



Voltage sensor is sub-miniature in size and weight

within ±5% under a variety of combinations of conditions.

Description: DC voltage sensor utilizes silicon transistors. Unit will sense voltages from three volts DC and up.

In operation, unknown voltage is compared to an internally generated reference voltage. When voltage exceeds reference by a few millivolts, difference is amplified and transmitted to a trigger circuit. Upon receiving this voltage, the trigger circuit goes from off to on state, energizing the output device.

(DC voltage sensor is product of Tempo Instrument, Inc., PO 338, Hicksville, N.Y.)

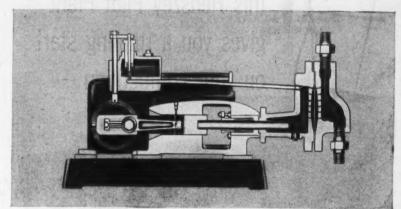
Check 1482 opposite last page.

Rotameters are discussed in functional bulletin. Basic advantages of variable-area flow meters are stated and various meters shown in their specific areas of application. Bul 110 — Brooks Rotameter Company.

Check 1483 opposite last page.

For more information on product on preceding spread, specify 1481... see information request blank opposite last page.

how to meter acids accurately against pressure



Controlled Volume Pump With Diaphragm Liquid End

Corrosive liquids present two major obstacles to achieving maximum metering accuracy, economy, and safety. For one thing, corrosion can introduce an intolerable everchanging volumetric error. For another, leakage can endanger personnel and necessitate the premature replacement of pump parts and associated equipment.

But both obstacles can be successfully overcome. First by choosing the right pump for the metering job at hand. Second, by making sure that all wetted parts of the pump chosen are inert to the liquid being metered. Here are some ideas based on practical acid metering experience that may help you to choose

the best controlled volume pump for

your metering needs.

Packed Plunger Pumps

For the majority of mildly corrosive liquids, low cost packed plunger pumps have proved themselves entirely adequate. Some thirteen materials of construction are standard on packed plunger pumps, running from cast iron to Hastelloy B and C, more than enough to satisfy mild corrosive metering requirements. Capacities to 2056 gph, pressures up to 50,000 psi.

An added tip: Standard Milton Roy motor driven pumps in corrosive service can be equipped with "catch-all" yoke type gland fol-

lowers.

Diaphragm Liquid Ends

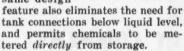
When the liquid to be metered is highly corrosive or otherwise dangerous, a controlled volume pump with diaphragm liquid end is the best choice. A plastic or stainless steel diaphragm positively separates the process liquid and the plunger. The plunger displaces a hydraulic fluid which in turn strokes the diaphragm to create pumping action through the ball checks. Consistently high accuracy is achieved through unique design features. As the illustration shows, positive mechanical action bleeds any air or vapor from the hydraulic side between strokes and corrects liquid volume if necessary. Internal liquid end design also automatically eliminates bubbles from the process liquid side.

Very often, a pump chosen for mild corrosive service is obsoleted by a process change specifying a more highly corrosive liquid. The diaphragm liquid end illustrated can easily be substituted for the conventional liquid end on any standard motor driven controlled volume pump, bringing the entire metering system up to date at little extra expense. Designs of this type will handle up to 400 gph against heads to 2700 psi.

Totally Immersed Liquid Ends

Acids with high vapor pressure or high specific

gravity require the Mersemetric® controlled volume pump. Pump drive and motorare mounted on the tank top, but the liquid end is completely submerged to a depth of up to fourteen feet. This same design



The maximum safety-minimum handling Mersemetric design is just about standard for metering sulfuric acid for demineralizer regeneration and pH control of cooling tower water and deaerator effluents. Capacities up to 218 gph, pressures up to 1200 psi.

The Acid Metering System

You can be fairly sure of making the right choice only if you consider all the factors. Here are several points that are often overlooked:

- Is the entire system corrosionresistant... storage tank, suction and discharge piping, controlled volume pump, and relief valve?
- Thoroughly consider the physical properties of the liquid. High vapor pressure or high specific gravity liquids may demand a suction head.
- Consider plant and personnel safety under all possible conditions.
- Consider maintenance as well as first cost in determining the economics of the system.

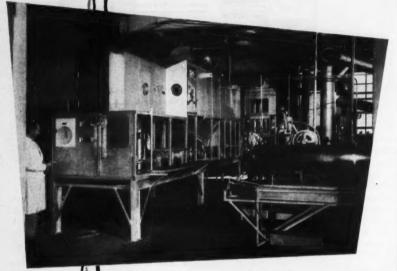
If precision pumping of dangerous chemicals is one of your problems, look again to Milton Roy's 25 years of experience for your most economical solution. Write for a general introduction to controlled volume pumping in Bulletin 553-1. Milton Roy Company, 1300 East Mermaid Lane, Phila. 18, Pa.



Controlled Volume Pumps • Quantichem Analyzers Chemical Feed Systems • pH Instruments

Check 1484 opposite last page.

this Henszey Pilot Plant gives you a running start on your competition



Designed and built with your profits in mind, this newly-installed process pilot plant is ready and waiting to test and prove your processing ideas.

The scaled-down Henszey evaporating, drying and heating equipment has a capacity of up to 800 pounds per hour. It will handle chemical processing experiments and test runs to your specifications.

These complete facilities, including the services of competent Henszey Engineers, are available dependent upon current test schedules. Write today for full particulars.



HENSZEY COMPANY

Dept. CP

WATERTOWN, WISCONSIN

ANOTHER HENSZEY PROCESSING first

Check 1485 opposite last page.

NEW LITERATURE

Petrochemicals

Surface condensers are described and illustrated in 16-page bulletin. Tables, a curve — and a complete example show how to check condenser performance. Bul C-10 — Elliott Company.

Check 1486 opposite last page.

Teflon O-rings and how they can be used to reduce friction and chatter in hydraulic and pneumatic systems, is discussed in sixpage Bul "Teflon Rings" — W. S. Shamban & Company.

Check 1487 opposite last page.

Variable-flow pumps and proportioning units for a wide range of services are covered in eight-page Technical Bul. 600 — Blackmer Pump Company.

Check 1488 opposite last page.

Air compressors, including data on rotory machines which deliver up to 19,400 cim at 100 psi, are discussed in four-page folder. "Stationary air compressors" — Atlas Copco.

Check 1489 opposite last page.

For more information on developments reported in this section, check corresponding numbers on Reader Service Slip opposite last page of this issue.

pH meter of exceptional stability and with full temperature compensation is discussed in data sheet EIL 28 AM — Milton Roy Company.

Check 1490 opposite last page.

Temperature controls for surface mounting for range up to 600°F are discussed in two-page bul MC-186 — Fenwal Incorporated. Check 1491 opposite last page.

Cryogenics and how it is used in the processing and separation of industrial gases is discussed in four-page bul. "Cryogenics" — American Messer Corporation.

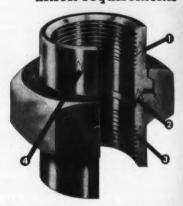
Check 1492 opposite last page.

Regulating relief valve which governs discharge pressure of constant speed pumps in oil or water service, is described in two-page bulletin. Valve is suitable for use at pressures to 500 psi and temperatures to 250°F. Section III — Atlas Valve Co.

Check 1493 opposite last page.



gives you all these features for your forged steel pipe union requirements



- Uniform walls for even expansion and contraction under temperature changes. They follow the pipel
- 2. Catawissa Ball-to-Angle Seats give you a "Perfect Seal" regardless of pipe alignment!
- 3. More than adequate wall thicknesses give you Catawissa's 3-to-1 Safety Factor (3000-lb, service, 9000-lb, test; 6000-lb, service, 18000-lb, test)!
- 4. Round, straight barrels for fast wrenching. No uneven or tapered surfaces to cause wrench slips or wrench locking!

Catawissa Perfect Seal Pipe Unions are made by Union Specialists from 80,000 lb. tensile strength steel (ASTM Spec. A-105-55T, Grade II). Steel forgings from our own forging mill are closely checked for imperfections . . . and finishing on modern, automatic machines with close inspection during and after production give you pipe unions second to none!

Write for Catalog 58 showing the complete Catawissa line of Perfect Seal Products.

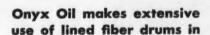
for complete, guaranteed satisfaction



CATAWISSA VALVE & FITTINGS CO.
CATAWISSA • PENNSYLVANIA

Check 1494 opposite last page.

CHEMICAL PROCESSING



Slashing Costs of Shipping Liquids and Pastes

DANA B. BERG, Managing Editor
with DR. PETER BOUROFF,
Assistant to the President and General Plant Manager
Onyx Oil & Chemical Co.
Jersey City, N.J.

F reight savings of up to 40 cents per drum add up to sizable totals when you're shipping 1250 to 1500 drumloads of product - wet and dry - every week. Add to this the savings obtained by eliminating the elusive but real costs of bookkeeping connected with drum reconditioning and return plus the need for separate plastic liners, at 50 cents each, for use with a number of your shipments . . . and you have the makings for a drastic trimming of the costs of doing business.

Such balance-sheet bonuses are not new to Onyx Oil & Chemical Co., who has been using lightweight fiber drums for its liquid, pasty and dry materials since the containers were first developed. Onyx now is using them for shipping about 75% of such materials from its two plants: Jersey City (N.J.) and Staten Island (N.Y.).

Unlined fiber drums, of course, were used extensively even before World War II for dry products not requiring special protection or containment. But much more recent

is the fiber drum for liquids and pastes or for dry materials requiring a barrier against outside moisture. This is a drum with a plastic lining on the inside, including the metal top and fiber bottom.

Onyx is using this type of drum, with a polyethylene lining, for such products as powdered high-grade (cosmetic or pharmaceutical) surface-active agents, emulsions, and vinyl-acetate and ureaformaldehyde resins. With some of the products, such as the emulsions, the drum prevents the liquid from leaking out. With others, such as powders or dry detergents, the purpose is primarily protection against contamination - moisture or otherwise.

The company uses sizes from one through 55 gallon. (Freight savings are of course proportional; the example given in first paragraph relates to a 55-gal fiber drum and same size steel drum. The emptyweight differential is 31 lb: 24 vs 55 lb.)

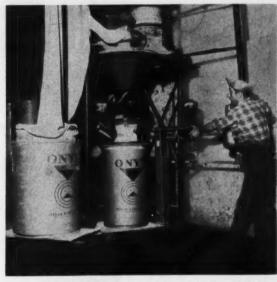
A new 55-gal, non-returnable, lined fiber drum costs roughly \$1.70 less than a new unlined open-head steel drum ... and about 15 cents more than a reconditioned drum. The non-returnable, 50-cent-each plastic liners, used sometimes two at a time to protect many previous shipments in metal drums, must also be considered in comparisons.

Heading-up of the fiber drums has required 50% less time, since the gasket is integral with the head and therefore positions itself positively. Storage of the lightweight empty fiber drums presents less handling problems for Onyx. Their lower cost of course means less capital investment.

On occasion, Onyx has sent rush shipments by air. Here the weight differential has brought real economics. And the airlines have welcomed the fiber drums, realizing they probably won't seriously damage plane frame and skin should they break loose.

(The Liquipak lined fiber drum is a product of Fibre Drum & Corrugated Box Division, Continental Can Company, Inc., 530 Fifth Ave., New York 36, N.Y.)

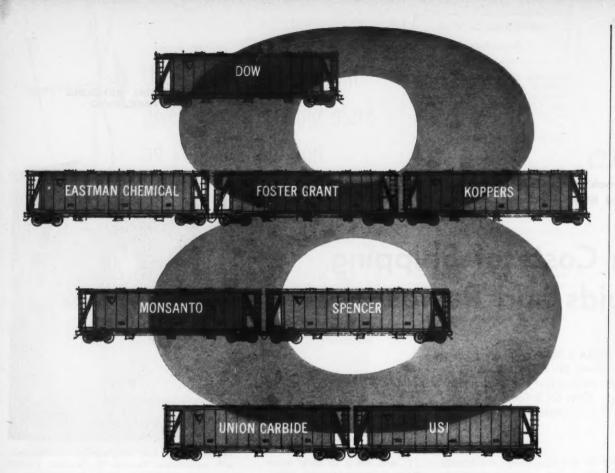
Check 1495 opposite last page.



Dry detergent is here being packaged in fiber drum with polyethylene coating. This protects product against contamination and pickup of moisture



Emulsion is packaged in lined fiber drum after being cooled by heat exchanger at left. Sturdy construction and water-proof plastic interior permit drum's use as liquid container



8 major chemical companies are now using the

DRY-FLO° CAR for bulk shipment of **POLYETHYLENE** and **POLYSTYRENE**

Ask the nearest General American office about the advantages of bulk shipment for your product.

Airslide® and Dry-Flo® Car Division

GENERAL AMERICAN TRANSPORTATION CORPORATION

135 South La Salle Street . Chicago 3, Ill. . Offices in principal cities



The Dry-Flo® car provides maximum sanitation and full protection for materials that require careful handling.

Check 1496 opposite last page.

HANDLING & PACKAGING

Rolls code on rear end of moving case

Uses: Places code imprint on rear surface of cartons and shipping cases as they travel along conveyor and casesealer line.

Features: Compactly designed for confined spaces. Imprints any size container from 3" high.

Description: Coding head automatically moves out of housing as container travels by, rolls imprint across rear surface, and then retracts to original position until next unit reaches point of coding. (Series 210 Rolacoder is a product of Adolph Gottscho, Inc., Hillside 5, N.J.)

Check 1497 opposite last page.

Iris flow-control valve can now be operated in hard-to-reach area

Uses: Positive flow control and shut-off of bulk materials from bins, hoppers, chutes. Can also be used in controlling flow of air in heating, ventilating and drying, where eddies are to be avoided.

Features: Due to addition of electric-motor positive drive and remote control for open-



Valve with diaphragm open position. Remotely controlled motor at bottom will close the valve by operating mechanism which twists and tightens the diaphragm to give iris-like appearance

ing and closing diaphragm, the valves can now be installed at inaccessible locations where manual operation is not possible.

Description: Flexible diaphragm of nylon, Orlon or other material opens and closes like camera iris. It rolls the material with it in closing. There are no metal parts in

which material can lodge and jam opened or closed.

Standard drive mechanism uses simple two-way switch, on and off. Partial diaphragm openings are obtained either by manual timing or by observation. Present sizes range from 4 to 12".

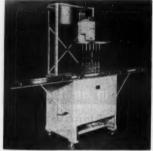
(Motorized iris flow-control valve is product of Syntron Company, 110 Lexington Avenue, Homer City, Pa.)

Check 1498 opposite last page.

Easy cleaning, adjusting are major features of gravity filler

Fills containers to one qt, at least 7/16" neck

Uses: For gravity filling of cans, plastic bottles, other standard containers up to one-gallon capacity and with minimum neck opening of



Six-spout gravity filling machine in new series

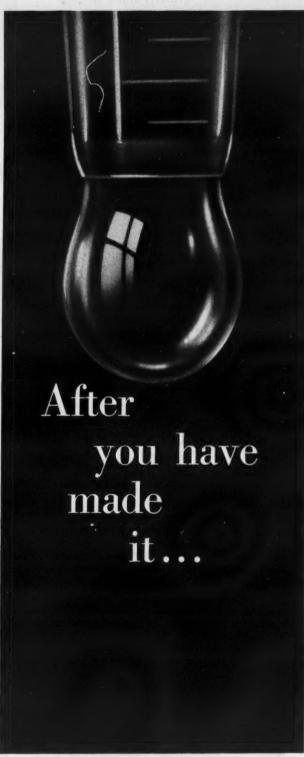
7/16". Reported as particularly good for foaming liquids.

Features: Spouts are dripproof, provide for quick horizontal and vertical changeover. Simplicity of spout design permits easy dismantling and cleaning.

Description: Spout-bar adjustment is horizontally controlled by simple handwheel. All contact parts are stainless steel. In dication of filling speed: One spout fills a quart bottle in eight seconds, with product similar to water.

(Model EGR gravity fillers are product of Ertel Engineering Corp., 8-14 N. Front St., Kingston, N. Y.)

Check 1499 opposite last page.



Vulcan Steel Containers are a good guarantee that your products will reach customers safely, and in perfect condition. Strong, dependable, economical Vulcan steel containers are available in sizes from 1 through 55 gallons. The industry's most complete selection of styles, closures, and linings makes them adaptable to your special product needs. You can even get them in decorator colors! All sizes of Vulcan Steel Containers are made under one roof. Shipments can be made with any combination of sizes from a truckload to trainload, to suit your container needs. Write today for complete information.

...ship it in

VUICAD®

Attach this ad to your calling card and mail today for

free literature, or

a meeting with your local 'Vulcansultant' a technical man who can help you with your container problems.

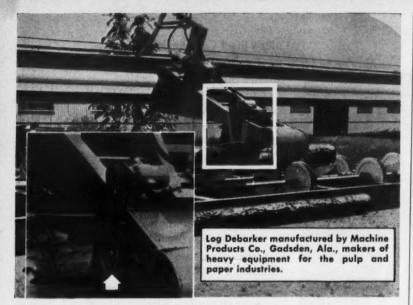
* In California: Vulcan Containers Pacific Inc., San Leandro

* In Canada: Vulcan Containers Limited, Toronto, Vancouver, B. C.

VULCAN CONTAINERS INC., Bellwood, Illinois, Phone: Linden 4-5000

CP-40

Check 1500 opposite last page.



This V-Belt Drive costs less,

takes shock loads chain couldn't handle!

Another manufacturing problem solved by the high capacity of Gates Super HC V-Belt Drives...

The makers of the Log Debarker shown above found that the chain drive on the debarker head could not always handle the shock loads characteristic of this operation.

To insure buyers of this machine top performance and freedom from down time, Machine Products Co. replaced the chain drive with Gates Super HC Drive.

Not only have they eliminated down time and replacement costs from shock-load breakage of the chain, the makers have also actually cut manufacturing costs because the Super HC Drive permits a smaller debarker head.

Nation-Wide Engineering Service

A Gates Distributor or Field Representative will show you how Super HC V-Belt Drives reduce sheave diameters 30% to 50%, reduce drive space up to 50%, and drive weight 20% and more. To learn more about Gates Drive Engineering Service ask him for a free copy of "The Modern Way to Design Multiple V-Belt Drives" or write the Gates Rubber Co., Sales Division, Inc., Denver, Colorado.

The Gates Rubber Company, Denver, Colorado Gates Rubber of Canada Ltd., Brantford, Ontario



World's Largest Maker of V-Belts



Gates Super (V-Belt Drives same hp capacity

Check 1501 opposite last page.

HANDLING & PACKAGING

Protects drum, operator against filling spills

Polyethylene cover retains overflow, valve leaks

Uses: Collects and holds overflow and valve drips during drum filling.

Features: Protects drum against corrosion and staining. Protects operator and drum handler against chemical burns.

Description: Cover is made of corrosion-resistant poly-



Openings molded into cover correspond to vent and bung openings in drumhead

ethylene in 15-, 30- and 55-gal sizes, to fit all standard fill lines on steel, fiber and polyethylene drums. It has built-in handles and molded pouring lips.

(Drum filling cover is made by Delaware Barrel & Drum Co., Inc., New Castle & Columbia Ave., Wilmington, Delaware.)

Check 1502 opposite last page.

Controls volume, air ratio of materials being fed to pneumatic lines

Can be mounted on truck,

Uses: Controlling feed of dry bulk material into pneumatic conveying line . . . both as to volume and material/air ratio. Has been successfully field-tested with materials such as cement, hydrated lime, zinc calcines, fly ash.

Features: Single source of



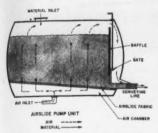
It's no trick at all to roll up to twelve Heat Exchanger tubes per minute with Airetrol, automatic tube expansion control. Operator merely dials desired torque on tool's micrometer head. Precision torque sensing mechanism automatically stops expansion at this setting. Pneumatically-operated Airetrol maintains .001" accuracy consistently. Write us for obligation-free demonstration, or descriptive Bulletin No. 64.



Check 1503 opposite last page.

air provides pressure for unloading, feeding and conveying. Unit may be mounted on truck, trailer or skids.

Description: Material is introduced through one or more



Simple construction and principle of operation are shown here

pressure-seal hatches at top of tank. It rests on one or more Airslide conveyors set at 8-10° slope and running parallel with long axis of tank. Top of each conveyor is an air-permeable membrane.

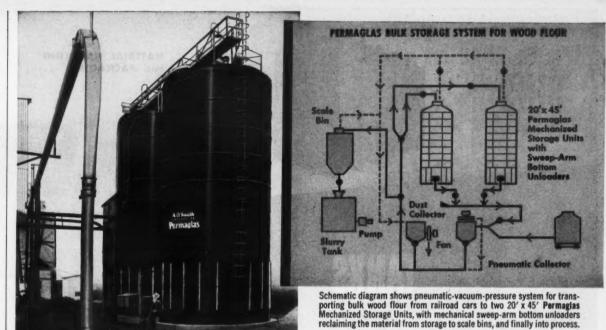
As air is blown in under the membrane, material on it fluidizes and flows toward discharge outlet. Gate opening within tank controls discharge rate to conveying line.

Baffle forms separate smaller chamber within tank. Air rising through the material passes over baffle, down through the small chamber, and mixes with material that has passed through the gate. (Airslide Pump is a development of Fuller Co., Catasauqua, Pa.)

Check 1504 opposite last page.



"These things are real handy for opening stuck windows!"



Permaglas Bulk Storage System paid for itself within 15 months"

The Joliet Illinois plant of the Ruberoid Co., one of the nation's leading manufacturers of dry-felt paper base for asphalt shingles and roofing paper, uses two 20'x45' Permaglas Mechanized Storage Structures with mechanical sweep-arm bottom unloaders which discharge tons of wood flour into processing—24 hours a day, 6-7 days a week. Capacity of each Permaglas Structure is approximately 100 tons.

Ruberoid reports A. O. Smith's exclusive mechanical sweep-arm bottom unloader made it possible for them to install a completely automatic system because it eliminated the problem of bridging and packing of the wood flour in storage.

This automatic *Permaglas* System paid for itself in 15 months through savings by purchasing wood flour in bulk-loaded boxcars instead of in bags, and in labor handling costs.

Now Ruberoid's Joliet plant enjoys these cost-saving advantages:

SAVING on production downtime because the mechanical sweep-arm bottom unloaders eliminated the problem of packing and bridging. They have been operating nearly continuously for almost 60 months without one penny for repairs.

SAVING on bulk wood flour purchases rather than in bags.

SAVING on labor costs. Savings on total manhours formerly required for handling and transporting of bagged wood flour to storage.

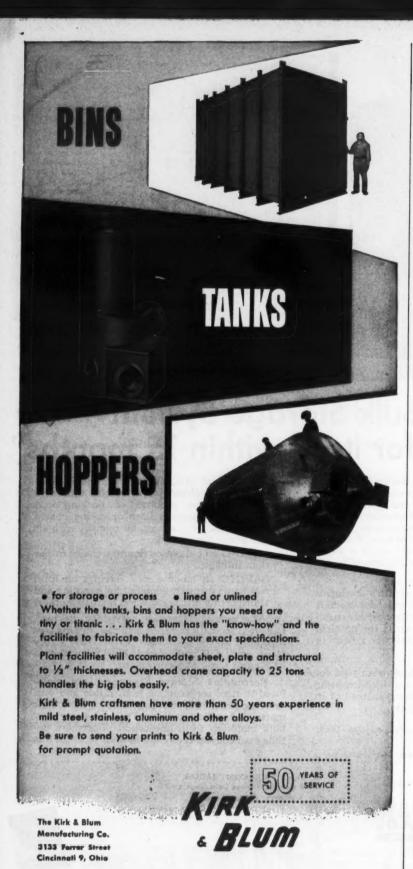
What's more, because of these savings, Ruberoid recently installed a 20'x50' Permaglas Structure at its Gloucester City, New Jersey plant, and a 17'x50' Permaglas Structure at its Kansas City, Missouri, plant.

Permaglas Storage Structures are glassfused-to-steel construction both inside and out, assuring completely sanitary, easy-to-clean bulk materials handling systems. They safeguard your bulk materials from infestation. For more details mail coupon today.

Throu	igh i	rese	arc	h	101 211	mil		. a	bet	ter u
A	1	n	1	6	9	1		F	1	
	0	R	P	0	R	A	Ļ	+	0	N
	HA	DV	EC	TO	DE	PI	20	DI	10	75

Permaglas Storage Units, Dept. CP-40 Kankakee, Illinois	
Send me free Permaglas Mechanized Storage Unit Bul	lletin MU-100.
Name	
Title	
Company	
Address	
CityZone	State

.............



Check 1506 opposite last page.

MATERIAL HANDLING and PACKAGING



Trailer holds 25 tons of cyanamid

On 520 ton/day, eight-mile bulk haul, switch to special truck . . .

Trims 43% from costs of moving cyanamid

DANA B. BERG, Managing Editor with G. W. Van SCHAICK Assistant General Manager Manufacturing Services Division American Cyanamid Company

PROBLEM: Twenty-nine 65ton-capacity covered railroad hopper cars (total capacity of 1885 tons) were required to assure a flow of 520 tons/day of cyanamid between the Niagara and Welland, Ontario, plants of Cyanamid of Canada Limited, only eight miles apart.

Most of the cause was delay inherent in the switching and schedules of the railroad serving the plants. But unloading—by two vacuum air conveyors—was slow, too. It took about five hours to unload one hopper car at Welland. Labor was high, too, since a total of eight men was required for unloading at Welland and loading at Niagara.

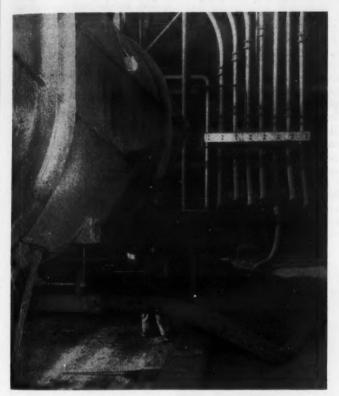
Solution: In 1958, the transportation job was taken over by truck—three special Air-

slide* trailers and two tractors. Each trailer holds 25 tons of cyanamid, loaded by gravity in 12 minutes through three hatches at top of the tank-like body.

The material rests on a supported air-permeable fabric forming a false bottom which slopes toward outlet at bottom center of trailer tank.

When trailer is to be unloaded at Welland, compressed air is introduced into false bottom, fluidizing the cyanamid resting on it and helping it to flow to outlet. Air that has passed up through bed of material enters open space above load, and then goes through a duct which leads down, through cyanamid bed, to tank outlet.

*Trademark of Fuller Co., Catasauqua, Pa.



Unloading takes only 25 minutes and one man, the truck driver. Compressed air enters trailer tank through hose under hand of driver; fluidized cyanamid leaves trailer in other hose, flows to permanent line leading to top of storage bin

The cyanamid is picked up into the air stream at the bottom of the trailer and conveyed under pressure through 5"-diam hose and pipe into storage silos 50' above ground level. Total conveying distance varies from 100 to 175'.

Unloading is done in only 25 minutes (a rate of 60 tons/ hr or better). One round-trip movement is completed in 11/2 hours.

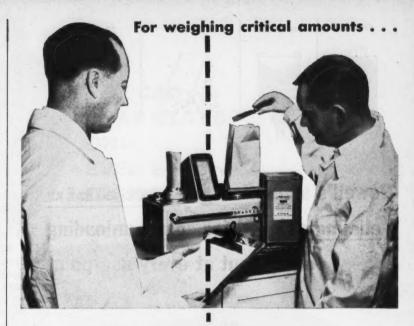
Results: Total cost reduction on this short haul is 43%. This comes about because of more efficient movement and less inventory in transit, lower freight rates and reduced labor costs (all necessary work in loading and unloading is performed by the truck driver). The eight men used for loading and unloading with the old method have been freed for other work.

(Airslide trailers used here were made by Delta Tank Manufacturing Co., Inc., subsidiary of General Gas Corporation, PO Box 1469, Baton Rouge, La.)

Check 1507 opposite last page.

(Exclusive distributor for the trailers is Trailmobile, Inc., 31st & Robertson, Cincinnati, Ohio.)

Check 1508 opposite last page.



Accurate readings are easier, faster with SHADOGRAPH

Shadograph balances, designed for fast, accurate production weighing operations as well as for laboratory use, offer weight indication you can read at a glance. Ultra-visible readings are made possible by sharp, shadow-edge indication on an illuminated dial. Friction is eliminated from indication system; balance comes to rest more quickly. Parallex readings are impossible.

Shadograph, a precision product of Exact Weight Scale Company, is backed by more than 40 years of experience in industrial weighing equipment. Write for Bulletin 3333.



35 BASIC MODELS

Shadograph models are available with capacities from 2000 milligrams to 100 pounds for use in compounding, check-weighing and for many types of labora-tory purposes. Dial and beam graduated in avoirdupois or metric, as specified. Shadograph is available with photocell controls for operating visual and audible signals or for control of auxiliary machines and equipment.

See Chemical Engineering Catalog pages 316-317 for more information on Exact Weight scales.



THE EXACT WEIGHT SCALE CO. 905 W. FIFTH AVE., COLUMBUS 8, OHIO

In Canada: 5 Six Points Road, Toronto 18, Ont.

Sales and Service Coast to Coast



BETTER QUALITY CONTROL . . . BETTER COST CONTROL

Check 1509 opposite last page.







Powell's simplified Invertabin eliminates need for costly unloading equipment at every use-point

One grab and rotating attachment on standard lift truck, one sling type inverter with monorail or crane, or one floor type inverter and fork truck can service any number of use-points. No costly permanent unloading station required at each point of use.

Invert-a-bin[®] ideal for in-plant or inter-plant handling. Fills easilyempties clean. Can handle the most difficult materials in that it can be tumbled, aerated, and vibrated. Available in steel and aluminum.

Semi-bulk handling with the Invert-a-bino replaces costly disposable packages, provides maximum flexibility with minimum capital investment and freight free advantages. Our Invert-a-bin® sales manager, Mr. Lew Lubenow, and our representative in your an engineering and economic survey.

area are available to assist you in making

Lic. under Pat. #2862645

THE POWELL PRESSED STEEL COMPANY 250 ERIE ST. . HUBBARD, OHIO

Check 1510 opposite last page.

Heat-sealing of polyethylene film and polyethylene-coated substrates is subject of an expanded and updated edition of brochure published in 1957. Thirty-eight charts present findings of tests dealing with manufacturer's polyethylene resins, taking into account all the various factors involved in heat-sealing. "Heat Seal Characteristics of Polyethylene Films and Coated Substrates" is issued by U. S. Industrial Chemicals Co., Div. of National Distillers and Chemical Corporation.

Check 1511 opposite last page.

Conveyor's height, length both are adjustable

Uses: Package conveying particularly to carry filled bags from weighing and packing equipment through sewing operation.

Features: An adaptation of manufacturer's previously announced GA-11 conveyor which allows changes in length from 7 to 12', this unit also has built-in jacks to adjust height between the ranges of 8 to 12" (standard).

Description: Surface of belt is absolutely flat since it rides on flat metal skid plates. Practically all sizes of bags may be conveyed since there are no obstructions or confining hases.

(Flat belt conveyor is made by Richardson Scale Co., 668 Van Houten Ave., Clifton, New Jersey.)

Check 1512 opposite last page.

Belt-conveyor totalizer has explosion-proof, simple design

Multiplies belt travel by its loading, pneumatically

Uses: Accurate weighing and totalizing of material being transported on conveyor belt. Unit integrates belt travel with belt loading to produce direct readout of true weight passing over weighing section.

Features: Simple, dustproof, explosion-proof design for low maintenance. Integrating wheel is designed to pass through zero, to subtract as well as add, allowing true zero to be determined when

running empty belt.

Description: Totalization is accomplished by pneumatically positioning an integrating wheel in proportion to belt load and driving this wheel with a rotating disc whose speed is proportional to belt travel. Integrating wheel is geared to cyclometer counter which totalizes weight.

tics ted

Instrument is designed for flush panel mounting. It is 14%" wide, 111%" high and 6%" deep. The linear-response integrator is reported to be highly sensitive and to use less than 0.3 scfm air. It's adaptable for electric contactors for operating remote totalizers.

(Simplified pneumatic integrator is a product of B-I-F Industries, Inc., 345 Harris Avenue, Providence 1, Rhode Island.)

Check 1513 opposite last page.

Next month . . .

PIGGYBACK TRIMS FAT FROM CPI FREIGHT BUDGETS

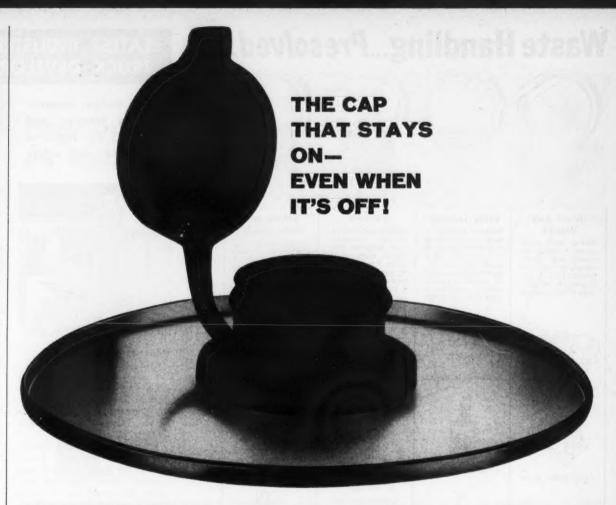
New schemes of containerization plus freer, rough-andtumble competition among carriers promise sizable slashes in transportation bills for the chemical processor. A highlight next month brings the subject up to date, reports how various top chemical companies are saving, analyzes what's ahead.

Material Handling & Packaging Featured

Other allied subjects slated for May include:

- When, where, why and how to use closed-circuit, controlled-atmosphere conveying
- . How Borden cut squeezebottle-labeling costs in half
- . . . and other case-history reports of "how it was done better," terse descriptions of new developments in material handling and packaging, current literature reviews.

Look for the big Material Handling & Packaging section next month!



CONTINENTAL'S NEW ALL-PURPOSE FLIP CAP*

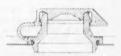
Continental presents new packaging beauty with economy and convenience, too ... Flip Cap* can, with dripless pour spout, is perfect for practically all liquids and granulated products now packaged in round or oblong nozzle-type cans.

Continental's new plastic Flip Cap is permanently of the can after tilling, Flip Cap permits higher filling speeds through a larger opening. And the top of the

hinged to its dripless pour spout-snaps back and stays open, snaps shut and stays shut. Inserted into the top

ASK THE MAN FROM CONTINENTAL!

Cap can't be lost-permanently attached by a hinge. Flip Cap is available in either 1/2- or 34-inch opening, and in a variety of colors.



Applied after filling, Flip Cap nozzie can be inserted automatically at 200 per minute. Full lithography on top of can.



CONTINENTAL CAN COMPANY

container can be fully lithographed-no solder splashes,

no flux spots or heat scorching. For the full story,

Eastern Division: 100 E. 42nd St., New York 17 Central Division: 135 S. La Salle St., Chicago 3 Pacific Division: Russ Building, San Francisco 4 Canadian Division: 790 Bay St., Toronto 1 Cuban Office: Apartado 1709, Havana, Cuba

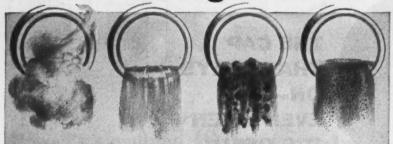
*Patents pending





Check 1514 opposite last page.

Waste Handling...Presolved!



Gases and **Vapors**

Waste and toxic gases • vapor re-covery and recon-densation • vacuum distillation * gas blowing • refriger-ants • low vacuum



Air Cooled Units



Fan Cooled Units



Water Cooled Units

Clear Liquids

Surface drainage • tank car unloading
process wastes viscous liquids
acids: sulphuric, hydrochloric, acetic
spent caustic
brine cyanides tank farm drainage



Submersible Pumps





Unique Designs

Slurries

iquids with ashes, fly ash, cinders, coal particles, catalysts, coke, sand, glass • tar • paint • pigments • adhesives • abrasives • molten sulphur • cane juice • black liquor





Series 6000

Shone® Electors



Pneu-Pumps

Solids and Semi-solids

Heavy, bulky, dry materials * acid slurries * sand * ashes * powdered coal * cracking catalysts * sludges * pulp







Package Shone®

Right now you may be puzzling over a particular waste handling job-which type of pump to use and whether pneumatic or electric; corrosion problems; reclaimable materials; precautions for hazardous wastes; and a dozen other considerations. Handling wastes is tricky, takes a know-how all its own.

For 61 years, Yeomans has been solving waste and drainage problems throughout industry. Once in a while, Yeomans engineers bump into a new twist, but usually the job is one that has been worked out time and again.

Chances are, your own problem is already solved. Why not contact your Yeomans engineer-representative and find out. He brings you a wealth of experience, plus types of equipment unique in the field. If you don't already know him, look in Sweet's Catalog or in the yellow pages of the telephone book under "Pumps."



Pumps and Waste Treatment Equipment

2003-5 N. Ruby St., Melrose Park, Illinois

Check 1515 opposite last page.

LATEST INDUSTRIAL TRUCK DEVELOPMENTS

. . . in design, capacity, operating features, and accessories for improved performance and safety



permit narrow-aisle operation and handling of loads in and out of storage with no clear-

ance between the loads. Unit

is said to combine the oper-

ating features of standard

high-lift walkie and the much

larger counter-balanced fork-

(Jackstacker Hydrafork is made by Dept. R9-36, Lewis-Shepard Products, Inc., 125 Walnut St., Watertown 72,

Check 1517 opposite last page.

Massachusetts.)



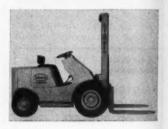
Delicate placement

. . . of loads by this 2500-lbcapacity electric fork truck is provided by its carbon-pile drive control. This permits steady, stepless acceleration for inching operations.

Fully loaded truck climbs 10% grade, and will travel up to 6.3 mph forward and reverse. With standard upright, lift speed loaded is 47 fpm: lowering speed is 80 fpm. Turning radius is 64".

(EC-25 fork truck is a development of Industrial Truck Division, Clark Equipment Company, Battle Creek, Michigan.)

Check 1516 opposite last page.



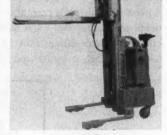
Fast pick-up and speed

. . make this pneumatictired, gas-powered electricdriven fork truck a good bet for yard operations. Standard in capacities of 4000 and 6000 lb, truck reaches travel speed of 9 mph light, 8.5 mph loaded, forward and reverse.

Gasoline engine transmits power through variablevoltage generator to matched DC series-wound electric drive motor. Since there is no direct mechanical coupling between engine and drive axle, transmission of road shock is impossible. Drive system provides controlled inching.

(Pneumatic-tired Dynamotive fork truck is product of Automatic Transportation Company, Division of The Yale & Towne Manufacturing Company, 149 W. 87th St., Chicago 21, Ill.)

Check 1518 opposite last page.



Forks extend

. beyond front wheels of truck to handle a wide variety of pallet widths. The hydraulically operated forks and general design approach

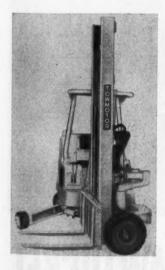
P-5924



Walkle tractor

... can also be used as standup rider in plants and warehouses. Powered by 12-volt battery, it's safe to use in confined areas. Ultimate drawbar pull is 550 lb with rolling capacity of 10,000 lb. Pushbutton controls on steering handle provide two speeds forward, two reverse. The spring-loaded handle applies 7" automotive brake when placed in vertical or horizontal position. Width is 271/2", length 463/4" without coupler. (TG-12 electric tractor is product of Barrett-Cravens Co., 628 Dundee Rd., Northbrook, Ill.)

Check 1519 opposite last page.



Front end pivots 90°

in either direction to permit right- or left-angle load stacking in a 6'-wide aisle. Hydraulically operated outriggers stabilize truck during pivoting. Wheelbase of truck

How our small plant solved its waste disposal problem WITHOUT CAPITAL OUTLAY...



Pat. No. 2,900,096

DEMPSTER - DUMPMASTER Equipped Hauler Provides Containers and Service for Small Fee

Our small Midwestern manufacturing firm did not generate enough refuse to justify ownership of its own refuse disposal system. Yet, it was plagued by unsightly trash piles, fire hazards and scattered refuse in the plant yard.

Our plant engineer then heard of a DEMPSTER-DUMPMASTER equipped private hauler in the adjoining city. A survey revealed that two big-capacity refuse containers, placed one at each end of the plant, would handle the entire refuse accumulation.

The private hauler placed the containers, and a small monthly fee covered maintenance, labor, hauling and dumping refuse. No capital outlay was involved, disposal costs were reduced, and plant house-keeping was vastly improved.

In all major cities, private haulers who own DEMPSTER-DUMP-MASTER equipment render fast, efficient, low-cost refuse storage and collection service. They place one or 100 containers at your service for a reasonable fee. A free brochure describes their service in detail.

Free Brochure and Name of Nearest Private Hauler on Request Dept.CP-4DEMPSTER BROTHERS Knoxville 17, Tenn.

Inc









PRIVATE HAULERS

Check 1520 opposite last page.

When CHEMICALS enter the

PACKING PICTURE

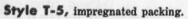
For use on equipment which handles chemicals, we make a wide variety of packing materials to fill different needs. Among them are:



Style No. 4
WHITE ASBESTOS PACKING—for use against hydrochloric, muriatic and phosphoric acids, sulphurous and caustic alkali solutions, for temperatures up to 600 degrees F.

Style No. 5
BLUE ASBESTOS PACKING—for use against sulphuric, benzoic and hydrofluoric acids, caustics, ferric chloride, etc., for temperatures up to 550 degrees F.

"Teflon" Products — "Teflon" does not melt or flow, and is the finest material known for use against solvents, acids, alkalies, caustics, etc. Recommended over a temperature range from -80 to plus 500 deg. F. Tensile strength ranges between 1500 and 2500 P.S.I. Can be used in combination with other sealing materials. Furnished in molded rods, tubes, V rings, solid ring gaskets, sheet, envelope gaskets, tape, O rings, and braided forms.





Style T-5B, braided packing.

If you need the solution to a specific problem, we invite you to call upon our service department, which will give your inquiry its immediate attention.



ALLPAX

"The Packing that Packs All"

SEND FOR OUR NEW CATALOG - TODAY!

A complete line of packing, tools, gasket materials. Ask for dealer information and price schedules.

THE ALLPAX COMPANY, INC.

160 Jefferson Ave., Mamaroneck, N. Y.

ANADIAN DISTRIBUTORS: Albion Asbestos Packings Ltd. Montreal 8. Queb

Check 1521 opposite last page.

HANDLING & PACKAGING

shown here is 59"; capacity is 4000 lb at 24" load center. (Model 590 fork-lift truck is development of Towmotor Corporation, 1226 E. 152nd St., Cleveland 10, Ohio.)

Check 1522 opposite last page.



Vacuum device lifts more than a ton

Uses: Handling of closed drums, barrels, sheet and plate steel, other non-porous materials.

Features: Standard unit has horizontal lifting capacity of 1200 lb; capacity in shear is 600 lb. The 16"-diam vacuum pad, with neoprene seal ring, is readily replaced with other pads from 8" to 24" diam, having lifting capacities of 300 to 2400 lb.

Description: Unit has 1/3-hp electric motor, vacuum pump, filters, muffller, gage, check valves, and three-way hand-operated c on trols for vacuum on, vacuum release and vacuum reserve. Height is approximately 18".

(The PAD PAC is made by Vac-U-Lift Company, a division of The Siegler Corporation, Salem, Ill.)

Check 1523 opposite last page.

For more information on developments reported in this section, check corresponding numbers on Reader Service Slip opposite lest page of this issue.





modern equipment.

BETTER BOLTS SINCE 1882

PAWTUCKE

327 Pine St. Pawtucket, R. THE PLACE TO SOLVE YOUR BOLT PROBLEMS ...

The Bolt Man"

Check 1524 opposite last page.

CHEMICAL PROCESSING

NEW LITERATURE Material Handling and Packaging

Pneumatic conveyors and application to the handling of dry pulverized or granular materials and related products are covered in four-page Cat P-60 — National Conveyors Company, Inc.

Check 1525 opposite last page.

Fueling lift trucks with LP-gas has advantages detailed in four-page brochure. Components and operation of such a fuel system are explained. LP-gas Brochure — Hyster Company.

Check 1526 opposite last page.

Towline-system automation and safety are subject of booklet. Literature reviews existing systems using automatic switching, accumulation and safety bumpers, and also outlines what can be accomplished in these systems. "Automation and Safety in Towline Systems" — SI Handling Systems.

Check 1527 opposite last page.

Handler for steel and fiber drums has its features and action described in four-page brochure. Device is reported to slip on or off the forks of any make or model lift truck quickly. Brochure MH-501 — Little Giant Products, Inc.

Check 1528 opposite last page.

Overhead cranes are described, and applications shown, in eight-page Bul L-116 — Northern Engineering Works.

Check 1529 opposite last page.

Electrification of overhead material-handling equipment is safe with conductor systems detailed in four-page Bul 2016-D — Cleveland Tramrail Div., The Cleveland Crane & Engineering Co.

Check 1530 opposite last page.

Heavy-duty counting scales are fully illustrated and described in bulletin. Included are portable, small and large bench, and dormant platform counting scales. Counting-scale Literature — Detecto Scales, Inc.

Check 1531 opposite last page.

Freight carloading check charts for wall-anchored, free-floating and controlled-floating loads are available to assist shipping-room and loading-dock personnel in preparing the car, draping the car, proper use of strapping tools, etc. Charts are clear, simple, fully illustrated. Signode Steel Strapping Company.

Check 1532 opposite last page.



1,322 COLORS of paint are offered by every paint dealer featuring the Colorizer Paint Color System. Adding Colorants to the base paint is a quick, easy, clean job—thanks to Colorizer's tough new "Colorpods" of "Scotchpak" Heat-Sealable Polyester Film.

"SCOTCHPAK" TAKES OVER

... streamlines a multitude of packaging jobs!

Looking for a film that's tough, clear as glass—one you can freeze or boil? And would you like that same film to be heat-sealable with a seal that's as tough as the film itself? Then your answer is "Scotchpak."

Here is a film that combines the best features of many films. It can be heat-sealed in less than 2 seconds—a temperature of 300° to 400° F. and 20-60 psi is all that's required.

"Scotchpak" Film resists freezing cold (down to -70°F.) and boiling heat (up to 240°F.). It resists acids, oils, alkalies and organic solvents. It is light (saves shipping

costs!) and compact (saves space in shipping and on the shelf, too!)

"Scotchpak" is now available in roll-stock widths up to 50 inches from 2 mils to 4.5 mils thick, ready for printing—if you desire. It can be easily handled on conventional bag-making and filling equipment.

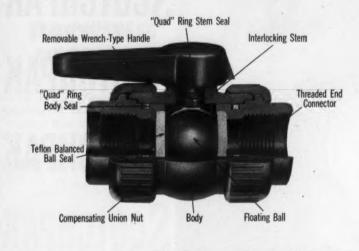
Our Customer Service organization is ready to work with you to show you how "Scotchpak" can solve your film fabrication and packaging problems. For complete information, write Film Products Group, Dept. CAE-40, 3M Company, St. Paul 6, Minnesota. SCOTCHPAK

MINNESOTA MINING AND MANUFACTURING COMPANY
... WHERE RESEARCH IS THE KEY TO TOMORROW

REGISTERED TRADEMARK FOR THE HEAT-SEALABLE POLYESTER FILM OF 3M CO., ST. PAUL 4, MINN. EXPORT: 99 PARK AVE., N

INERT TO CORROSION...

full flow ball valve-1/4 turn off!



specify CHEMTROL PLASTIC VALVES

for liquid and gas transferring operations.

Here's a complete line of plastic valves that cuts replacement costs and downtime wherever acids, alkalies and many solvents are handled! CHEMTROL VALVES feature quick ½ turn shut-off, no direction change to cause turbulence or loss of pressure, no sticking or scaling, no contamination to pure solutions. Broad chemical resistance as well as good performance in high temperature ranges. With union type end connectors, valves are quick to disassemble and seats are adjustable for takeup.

Available in 5 basic plastic materials and an extensive size range.

CHEMTROL IS THE *LEADER* in plastic valve manufacture...proved over the years! Dealers in all major industrial areas.



Ball Valves

Check Valves

3-Way Valves

Foot Valves

Cock Valves

CHEMTROL

404 West Central Avenue, Santa Ana, California

Check 1534 opposite last page.



PLANT ENGINEERING MAINTENANCE & SAFETY



Made-to-fit "envelopes" like those covering pallet-loads of bagged materials on first two carts were made from resistant, lightweight, strong plastic-nylon fabric

Resistant Fabrics Prove Out As Chemical Cover-Ups

Lightweight, strong combination of vinyl or Hypalon and nylon lasts years in tough service

DANA B. BERG, Managing Editor with PAUL M. TOMPKINS, Plant Manager American Cyanamid Company Linden, New Jersey

PROBLEM: Canvas tarpaulins were wearing out fast —often in a year or less—at American Cyanamid's plant in Linden, N. J.

These tarps were used on rack trucks, flatbed trailers and carts to protect bagged materials during transport throughout the plant grounds, to and from the company warehouse several miles away, and to some distribution points somewhat farther away. One was used as a permanent cover on rack truck that took workmen to and from plant impounding

area where waste dry and wet products were discarded.

Rotting of the material was no doubt hastened by the sulfur dust and sulfuric acid fumes in certain areas of the plant through which the vehicles passed. This was particularly true for the truck that was exposed to the dusts and fumes of the impounding area.

A rubberized canvas would have overcome this problem, but the weight and bulk would have made handling and tie-down even more cumbersome than with ordi-



Tarpaulins of heavier Hypalon-coated nylon fabric are used to

nary cotton duck canvas.

Solution: Late in 1956, the plant began use of a lightweight, strong material called Herculite. The material is made of either a vinyl plastic or Hypalon coated on a tough nylon base (the same as used in truck tires). It is waterproof, fire-resistant, highly tear-resistant, non-shrinking, and serviceable down to -40° F. It's unaffected by alkalis and most acids, can't be weakened by mildew or rot. Punctures do not spread, are easily patched.

Different weights and colors are available, including translucent grades, where one needs natural light to go through, such as for a windbreaker in construction.

The Linden plant uses an approximately 14.5-oz/sq yd fabric (Hypalon-coated) for over-the-road trucks and trailers. They had special "envelopes" made up to fit pallet-loads of bags on the carts. Here a lighter weight, less costly vinyl-and-nylon material called Herculite Builder (approximately 6.3 oz/sq yd) was used, since no over-the-road travel at faster speeds is involved.

Results: Rotting from mildew or fumes is a thing of the past. Many of the covers have been in constant use for two to three years. The light weight and flexibility of the material have made handling easier and more efficient, saving labor costs. Replacement and repair costs are, of course, almost nothing.

Other Plant Uses

A year or so after adoption of these fabrics for the above uses, they started to find their way into other applications in the Linden plant. The plant fire truck uses a sheet of Herculite 80 grade (red on top, gray on bottom side) to cover the coiled fire hose, protecting it from possible chemical attack.

A rather recent innovation is found in the power house. Special covers made from the fabric are slipped over the excitors on the three generators whenever they are shut down for inspection (usually once a week). The covers prevent settled dust from wearing the commutators when the generator is started up again after inspection.

(Herculite fabrics are made by Herculite Protective Fabrics, 661 Fourth Street, Newark 7. N. J.)

Check 1535 opposite last page.

PEABODY PACKAGE GAS SCRUBBERS

CLEAN CONDENSE ABSORB

REMOVE-

- . DUST
- . SMOKE
- TOXIC
 MATERIALS
- ODOROUS
 SOLVENT
 VAPORS



A Peabody Package Scrubber for gas capacities of 500 to 6,000 c.f.m. can be set in place as a complete package and connected to existing facilities. The unit includes the scrubber, recycle pump, recycle tank complete with piping and valves, exhaust fan and motor. For flue-fed incinerators a fixed automatic by-pass to atmosphere prevents blow-back through furnace and charging doors.

Compact, Efficient, Economical Peabody Package Scrubbers:

- remove dust from material handling, screening and crushing operations
- remove odorous solvents from air vents
- clean incinerator gas of smoke, dust and some toxic materials
- clean air of metallic dust from lathes, grinders, millers and shapers in machining operations
- remove dust and condense solvent vapors leaving rotary and spray dryers

Write today for complete information on these efficient package units and your copy of the new Peabody Scrubber Bulletin 203-C!

PEABODY ENGINEERING CORPORATION

232 MADISON AVENUE, NEW YORK 16, N.Y.

OPPICES IN

SUSSIDIARIES
In England: PEABODY LIMITED In Connec: PEABODY
ENGINEERING CORPORATION OF CAMADA LTD.

Check 1536 opposite last page.



the Perfect Mate for your RIDAID Pipe Wrench!

Finest of All Adjustable Smooth-Jaw Wrenches

MORE GRIPPING POWER...

for all nuts. Puts a wraparound grip on hexes that just won't slip. Because you're pulling with at least three flat sides at once, you'll never round off shoulders. Works on square nuts, valve packing nuts, unions and gas cocks and flat shapes, too. Smooth jaws won't even mar polished or plated surfaces.

RUGGED CONSTRUCTION...

built good and solid. Thin but extra-strong jaws slip into tight places. The first time you use a hex wrench you'll know that here's a wrench you'll use for a long, long time. It's every bit as rugged as your familiar RIEGID Pipe Wrench.



Offset Hex Wrench

Big Jaw, Short Handle for Sink and Tub Drain Nuts

Maximum Jaw Opening-21/2" across flats.



RIEQID No. E-11 End Hex Wrench

Offset Jaw for Easy Work in Tight Places

Maximum Jaw Opening— 1½" across flats.

From experience you know it's easier to work with the best of tools.

Order your RIBBID Hex Wrenches from your Supply House today!



Check 1537 opposite last page.

Chemical Boobytraps

Unsuspected hazards awaiting the unwary

Hydrogen sulfide killer that may not smell

There are on record several incidents wherein hydrogen sulfide, either from a cylinder or accidentally generated by acid on sulfide, caused serious injury.

Most recent of these occurred when an operator apparently turned the wrong valve, causing effluent from filter press to flow into a sewer, rather than into the storage tank where polysulfide wastes are usually routed.

Reaction of sulfides with acids usually in sewer caused hydrogen sulfide to form and seep up thru open floor drains, thus overcoming an operator. In spite of prompt action by emergency crew (who utilized self-contained oxygen-breathing apparatus) and immediate artificial-respiration attempts, operator could not be revived.

Explosive limits of hydrogen sufide are 4.3 to 45.5% by volume in air. Odor is not reliable criteria for detection. Although it is distinct at 0.3 ppm and strong and marked (but not intolerable) at 20 to 30 ppm, odor of higher concentrations does not become more intense. Apparently smelling nerves in nose are paralyzed by higher concentration s—a limitation demanding extreme care.

(Contributed by Howard H. Fawcett, Safety Director, Research Laboratory, General Electric Company, Schenectady, N.Y.)

Positive-motion indicator safety mechanism is guarding device, designed to convert rotary motion into an electrical signal. Signal impulse may be used to energize an alarm system or to control switches automatically. Description of unit is contained in Bul RG-21—Bin-Dicator Co.

Check 1538 opposite last page.



FOR MIXING

- Dry and Semi-Wet Chemical Powders
- Agricultural Chemicals
- Materials for the Plastics Industry
- Materials for Chemical Processing Plants
- Sweeping Compounds
- Pharmaceuticals
 Fertilizers

A uniform mix is assured time after time, no matter how complicated the formula, and with laboratory exactness. If the formula is right —the MARION MIXER will mix it with complete accuracy.

THE EXCLUSIVE MARION MIXING and BLENDING ACTION will handle any type of chemical materials and give a top quality mixed product at less cost.

Send Today For Free Descriptive Literature

RAPIDS MACHINERY COMPANY

AT ALL PRESSURES

865 11th Street

Marian Inva

Check 1539 opposite last page.

Cook NO ADJUSTMENTS
NO ORIFICE CHANGES

FROM 0 TO 250 LBS

Here is the World's most flexible steam trap. The balanced pressure principle of its exclusive Dual-Valve* instantly adjusts to all changes in pressure or to varied peak loads, and delivers perfect performance at any range from 0 to

250 PSI.

Patented

| University | Committee | Commi

The PSC Unitrap also offers the fastest warm-up time, and tremendous capacity per unit size. Valve seats are self-seating and self-cleaning, and the Dual-Valve reduces wear and wire drawing to a minimum.

Contact our nearest office for full information or write for Bulletin 800C.

Available in stock in pipe sizes from 1/2" through 2".

"WHERE Good Connections COUNT"

PERFECTING SERVICE COMPANY, 332 Atando Ave., Charlotte, N.C. Baltimore-Bulfalo, Camden, N. I. - Chicago - Cleveland, - Los Anceles New York - Providence - Montreal - Toronto.

Check 1540 opposite last page.



Specific design for pumping corrosives

Here is the first pump designed specifically for long life in heavy duty corrosive service.

Durcopumps are made in fourteen standard alloys and special materials. Four bearing housings plus separate frame adapters give maximum interchangeability for all pump sizes.

Maintenance is short and sweet because the working parts can be removed as a unit—in minutes—serviced and reinstalled by a single trade. Pump casing, piping and motor are not disturbed.

Durcopumps are produced in standard, self-priming and vertical submerged designs. Pumps are available with heads to 345 ft., capacities to 3500 gpm, in sizes from 1" x 1" to 10" x 8". Standard operating temperatures to 500° F.

Call your nearest Durco Service Engineer or write for literature on your service application.



more information on product at right, specify 1541 see information request blank opposite last page.



Visual-proof test verifies tightness of seat in valve

Uses: Fluid-control applications.

Features: Visual-proof test upon each closure of valve permits operator to verify the effectiveness of seat tightness. Valve design eliminates use of auxiliary line blinds.

Description: Non-lubricated gate valve incorporates dual metal-to-metal and elastomer seals. It will perform in temperature range of -40 to +400°F. Valves are available in sizes ½ to 24" in 150-lb series, and 1½ to 16" in 300-lb series, and 1½ to 16" in 300-lb

(Block-bleed-test valves are product of Pacific Valves, Inc., Long Beach, Calif.)

Check 1542 opposite last page.

Slip rings and brushes are found absent In drive

Adjustable-speed units have only 2 rotating assemblies

Uses: Adjustable-speed drive applications.

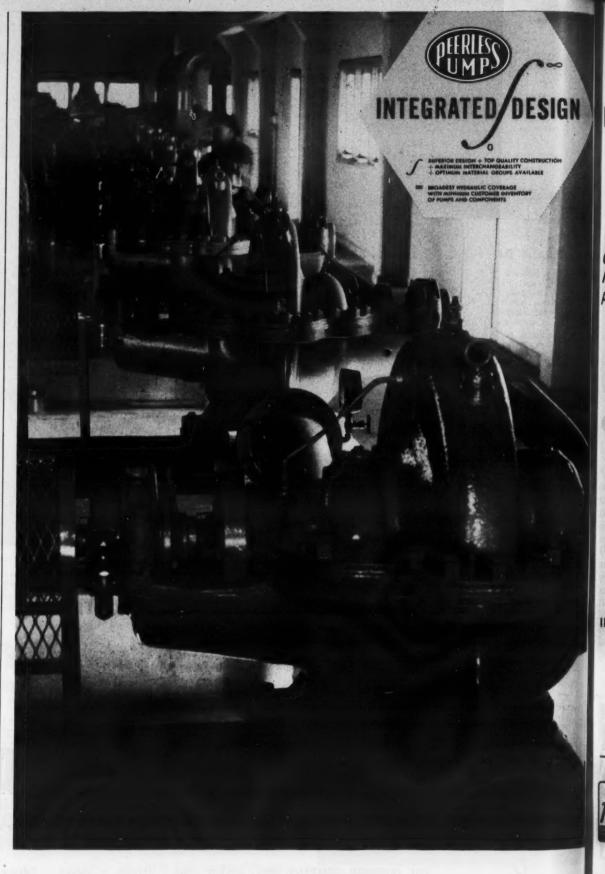
Features: Drive unit incorporates only two rotating assemblies. Coupling field coil



Eddy-current coupling adjustable-speed drives are available in complete package, including drive unit, control enclosure with control for both coupling and integrally mounted AC motor, and operator's station

and tachometer generator are stationary, with no brushes or slip rings.

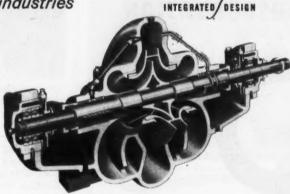
Description: Eddy-current coupling adjustable-speed drives are available in models of 5 to 100 hp. Stepless adjustable-speed drive is offered as complete package, including drive unit, control enclosure with control for



MEANS ONE SERIES OF PUMPS GIVES YOU THE VERSATILITY TO HANDLE THE WIDEST RANGE OF SERVICES

Optional construction features quickly adapt this Peerless horizontal centrifugal unit to many pumping applications in the process industries

Naturally, when selecting pumps for all your plant requirements, you look for quality equipment: Sound design and best materials mean optimum performance, longer life, higher efficiency, lower operating cost; less maintenance, fewer shutdowns and repairs. Peerless Type A pumps give you all these advantages and more: Simplified construction and maximum interchangeability means broadest hydraulic coverage with minimum inventory of pumps and parts. The Peerless Type A pump can really do an "A Plus" job in any number of situations calling for moving water, hydrocarbons and other nonabrasive fluids in your plant. Ideally suited for transfer, booster, recirculating services, as well as maintaining line pressures, the Peerless Type A pump is a good pump to know more about. Peerless Type A pumps are also available in ductile iron. So be sure you get the facts on this versatile line for your plant. Send for the highly informative bulletin No. B-1300 today.



PEERLESS TYPE A GENERAL PURPOSE PUMP FOR CONTINUOUS DUTY

The Mechanical construction of the Type A pump is superior as is its hydraulic characteristics. Oversize shafts, heavy duty ball bearings, modern design wear rings and shaft sleeves all contribute to ample protection against wear. Bearing seats are cast and bored integral with pump case assuring permanent alignment. Impellers are hand finished inside and balanced for accuracy. And all parts are machined to gauge in an interchangeable parts system that permits substantial reduction of part inventories.

INTEGRATED DESIGN FOR GREATER EFFICIENCY AND ECONOMY



GENERAL CHARACTERISTICS

SIZES – Double suction 1½" through 42" discharge.

CAPACITIES – Up to 70,000 gpm.

HEADS – Up to 400 feet.

TEMPERATURES – Handle liquids up to 300°F.

DRIVES – Direct-connected electric motor, diesel, natural gas, gasoline engine; steam turbine; combination drives.

Belt drives also available.



Putting Ideas to Work

Peerless
Pump
HYDRODYNAMICS

DIVISION

Offices:

New York; Detroit; Cleveland; Chicago; Indianapolis; St. Louis; San Francisco; Atlanta; Plainview; Lubbock; Phoenix; Albuquerque; Los Angeles; Fresno. Distributors in principal cities.

Consult your telephone directory.

Peerless Pump, Hydrodynamics 8 301 West Avenue 26, Los Angel	Division, Food Machinery & Chem. Corp. les 31, California
Send me Bulletin B-1300 🗆	Have field engineer contact me
Company	
Name	
Address	
City	State

Check 1543 opposite last page.

both coupling and integrally mounted AC motor, and operator's station. Ratings through 20 hp are capable of continuous operation down to 100 rpm at rated torque, providing speed range of approximately 17.1

(Kinatrol speed variators are product of Direct Current Motor and Generator Department, General Electric Company, Erie, Pa.)

Check 1544 opposite last page.

Single operation suffices for double gasketing of bolts or studs

Wired and non-metallic types are available

Uses: Gasketing of bolts or studs.

Features: Lattice structure of gasket tape permits double gasketing around both sides of studs in one operation, thus forming double seal.

Description: Double-seal asbestos gasket tape is available in three types — plain wireinserted folded asbestos tape with open lattice (or bolt



Lattice structure of double-seal asbestos gasket tape permits double gasketing around bolts of studs in one operation

space) center (Style 746); plain wire-inserted asbestos tape, woven flat to desired dimensions and bolt-space openings (Style 738); and plain woven non-metallic asbestos tape (Style 748), similar to Style 738.

(Asbestos gasket tape 738, 746 and 748 are products of Fibrous Products Division, Union Asbestos & Rubber Company, 1111 W. Perry St., Bloomington, Ill.)

Check 1545 opposite last page.

PIN

POINT

YOUR

GAS

TRANSPORTATION



WITH

TAYLOR-WHARTON

MOBILE

GAS STORAGE

HARRISBURG STEEL CO.







Check 1546 opposite last page.

ENGINEERING & SAFETY

Ultrasonic cleaner designed for medium power uses

Uses: Cleaning machined parts and other small mechanical components by use of ultrasonic energy.

Features: Unit is designed for continuous operation. Generator has average power output of 250 watts and produces peaks of 1000 watts.

Description: Ultrasonic cleaner has seven-gal capacity stainless-steel tank measuring



Ultrasonic cleaner has seven-gal capacity tank, medium power unit

14¾ x 11¾ x 10" deep. Tank has rounded corners to facilitate rinsing. Crystals cover 27.5% of tank's bottom. Actual radiating surface is 48 sq in.

Generator is 115-volt AC single-phase 60 cycle. Unit features one-tube oscillator. Front panel switching permits choice of either of two transducers. Other features include forced-air cooling and three-wire ground protecton. Total cost of ultrasonic cleaner is approximately \$745.00.

(Model-140 ultrasonic cleaner is product of National Ultrasonic Corp., 111 Montgomery Ave., Irvington 11, N.J.)

Check 1547 opposite last page.

Urethane-foam insulation boasts low K factor

Uses: Pipe-insulation applications.

Features: Insulation has K factor of 0.14 at 70°F. It is designed for use in temperature range of -300 to +220°F.

Description: Rigid urethane-foam pipe insulation has density of 2.3 lb/cu ft. It is not affected by most mastics and sealers normally used for cold insulation. Material is self-



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Check 1548 opposite last page.

CHEMICAL PROCESSING

JUSTRITE

... America's greatest name in SAFETY CANS and **DILY WASTE CANS**



"JUSTRITE" on a safety can or oily waste can is positive assurance of protection. Millions of these carefully designed and engineered cans are in use in thousands of plants all over the United States. Reduce fire hazards due to benzine, oily rags and waste. JUSTRITE Safety Cans are the finest cans for use for flammable or highly volatile liquids. Both types of JUST-RITE cans are Underwriters' Laboratories and insurance companies' approved.



FREE!

Send today for your copy of the bulletin showing the Justrite Safety Benzine Cans, Oily Waste Cans and

NORTH SOUTHPORT AVENUE CHICAGO 14, ILLINOIS

world's standard of safety since 1906

Check 1549 opposite last page. APRIL 1960

ENGINEERING & SAFETY

extinguishing and has no capillarity. Insulation is available in half-round sections-36" long or in block form.

(Unarco U-200 pipe insulation is product of Fibrous Products Division, Union Asbestos & Rubber Company, 1111 W. Perry St., Bloomington, Ill.)

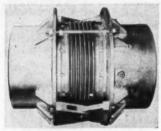
Check 1550 opposite last page.

Heavily loaded lines made self-supporting by expansion joints

Uses: For pipe systems which cannot be supported or anchored by conventional means, due to size or location.

Features: Joints permit pipe system to be entirely selfsupporting. This eliminates need for additional supports, reducing pipe bending stresses. Shear loads can be carried by units which can also absorb pipe weight, wind loads and other dead loads without extensive anchoring.

Description: Standard-model hinged expansion joint is designed to take rotation in one plane only. Because of



Standard model of hinged expansion joint is designed to take rotation in one plane only

this, they are used in combinations of two or three. Slotted hinges are available for special applications when axial movement must be permitted. These units do not absorb axial pressure thrust.

Three basic types of expansion joints are available to meet requirements of movement, pressure and temperature conditions.

(Hinged expansion joints are product of Zallea Brothers, 815 Locust St., Wilmington 99, Delaware.)

Check 1551 opposite last page.

SHAND L-P-G VALVE: SAFE, SURE, and TIGHT





HYDRAULICALLY ACTUATED SAFETY VALVES

When pressure drops ... the spring-tensioned S&J valve closes tight - quickly! Positively! In LPG tanks, pipe lines, and manifolds, the S&J Internal Safety Valve (Fig. 6129) is your most reliable safeguard. 5 sizes: 2", 3", 4", 6", 8". Get the facts: your inquiry will receive immediate attention.



SHAND JURS

GENERAL PRECISION COMPANY

SHAND AND JURS CO.

2600 EIGHTH STREET BERKELEY, CALIFORNIA A subsidiary of General Precision Equipment Corp.

Tulsa Los Angeles **New York** 285 Madison Ave. Thompson Bidg. 6399 Wilshire Blvd. M & M Bidg. 10409 S. Western Ave. Terminal Tower REPRESENTATIVES: Seattle • Denver • Montreal • Toronto • Vancouver • Calgary • Mexico, D.F. Caracas • England • and other countries

Check 1552 opposite last page.

ROTEX°

SCREENERS and New Rotex COOLERS



ROTEX SCREENERS

- Completely enclosed and dust tight.
 Quiet running, counterbalanced drive.
- Horisontal gyratory motion gives clean, accurate separa-tions and high capacity.

 Heavy welded, steel construction.
- Low head room and fast screen changes.
- ROTEX Ball cleaners prevent screen blinding.
 Over 30 standard models with from 1 to 5 screen surfaces.



NEW ROTEX COOLERS

- Completely enclosed and dust tight.
- Well known, quiet running, counterbalanced ROTEX
- Horisontal gyratory rotation keeps material in constant contact with entire cooling surface.
- Heavy, welded, steel construction with stainless steel interiors.
- occessible interiors with rounded corners and smooth, polished surfaces to meet sanitary standards.
- High cooling efficiency in a low cost, sanitary, easy to

ROTEX Screeners have been widely used for nearly half a century. Now we offer the new ROTEX Cooler. Write for information on your screening or cooling application. Our experienced engineers will be pleased to cooperate with you.

ROTEX

THE ORVILLE SIMPSON COMPANY

1246 Knowlton Street Cincinnati 23, Ohio

Check 1553 opposite last page.

ENGINEERING & SAFETY

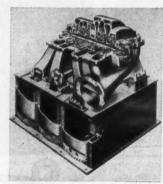
Air furnished at 110 psi in 5000 to 38,000 cfm capacity range

Integral intercoolers placed after compression stages

Uses: Furnishing air for variety of industrial applications. Compressor is suited for single-unit 100% operation or as high-capacity baseload machine.

Features: Compressors furnish air at 110 psi. They have integral intercoolers between each stage of compression.

Description: Multi-stage centrifugal air compressor is



Each compressor is furnished with complete package, including matching driver, intercoolers and lubricating system

available in six case sizes, with hp ranging from 1000 to 8000 bhp. Capacity range is 5000 to 38,000 cubic feet per minute.

Each unit is furnished as complete package, including matching driver, intercoolers and lubricating system. Compressor can be furnished with induction motor, synchronous motor, or can be adapted for other types of prime movers.

(Type H compressor is product of Clark Bros. Company. One of the Dresser Industries, 600 Lincoln Avenue, Olean, New York.)

Check 1554 opposite last page.

For more information on developments reported in this section, check corresponding numbers on Reader Service Slip opposite last page of this issue.



SURESEAL MOST SPECIFIED WHERE

- the handling of acids and other corresive materials demand maximum hand protection.
- production requirements prescribe fast, sure handling ef
- positive protection against crippling and disfiguring accidents is a necessity.
- longer glove life is needed.

Surety Sureseal Cloves, (made from Hycar) give positive protection against the greatest number of acids and other corrosive liquids and wear up to 14 times longer than competitive materials. They are more snag, abrasion and puncture-proof and the exclusive Surety Turn-Cuff gives added protection for arms and prevents liquid from getting into the glove.

Tell us your requirements and test a pair today — at our expense. Write on your letterhead naming your glove jobber and you will receive a pair by return mail.



IN CANADA: Safety Supply Co., Toronto

Check 1555 opposite last page.

Balbbille Adjustable SPROCKET RIM

with Chain Guide CHANGES THAT DANGER ZONE TO A SAFETY ZONE





The distance between the floor of your plant and your overhead valves is a DANGER ZONE when piled up ZONE when piled up boxes or even ladders are used to reach the valves. valves.
Turn it into a SAFETY
ZONE — equip your
overhead valves with
Babbitt Adjustable
Sprocket Rims with
Chain Guides.

- They simplify pipe layout.
- They fit any size valve wheel.
- They are easy to install and operate.
- They operate any valve from the floor.
- They save time and money.
- The first cost is the only cost (no maintenance).
- They are packed completely assembled (one to a carton), with easy-to-follow instructions. A hot-galvanized rust proof chain is avail-
- able for all sizes.

Babbitt Adjustable Sprocket Rims with Chain Guide are carried in stock by most mill supply houses. If your supplier does not carry them, contact us direct.

Babbilt

STEAM SPECIALTY CO.

14 BABBITT SQUARE, NEW BEDFORD, MASS., U.S.A.

Check 1556 opposite last page.

CHEMICAL PROCESSING

New Construction and Design ... New Magnetic Power

Greatest magnetic strength

per dollar ever offered!



Protect your machinery and production. Safeguard your product quality and reputation. Eriez Series 17 Plate Magnets can pay for themselves many times over in many ways. All welded steel and stainless steel construction is standard on these all-new plate magnets in every model. They're more compact and rugged than previously available models . . . and designed to assure ease of installation in chutes, spouts, ducts, feed tables, and housings; and for suspension over screens, moving conveyors, etc. Wide mounting flange for better, easier dust-tight installation. Uniform

dimensions for greater interchangeability.

Tops for performance because of their Eriumpowered* magnetic circuit providing intense
concentration of power in the most essential
areas (three strengths available).

*Erium—an exclusive, high quality permanent magnetic power source specifically designed and energized by Eriez.

Nere's the finest, most versatile plate separator performance at the lowest dollar cost. Write today for complete data on Series 17 Plate Magnets to:

Eriez Mfg. Co., 73-DB Magnet Drive, Erie, Pa.



Check 1558 opposite last page.

ENGINEERING & SAFETY

Pressures up to 5000 psi prove no problem for pumps

Uses: High-pressure cannedpump service.

Features: Units are available for pressures as high as 5000 psi. Pumps are hydro-



Seal-less, leak-proof cannedpump line includes models for open-flow capacities to 350 gpm, heads to 250' and temperatures

statically tested at 1½ times rated pressure.

Description: Seal-less, leak-proof canned-pump line includes models for open flow capacities to 350 gpm, heads to 250' and temperatures to 1000°F. Standard units are available for line pressures of 600, 900, 1560, 2000 and 2500 psi.

(High-pressure canned pumps are product of Chempump Division, Fostoria Corporation, Box 35-26, Huntingdon Valley, Pernsylvania.)

Check 1559 opposite last page.

formulator and spray gun team up to quickly mix and discharge

Spray gun also is used as pouring instrument

Uses: Spray application of plastics and other plural-component materials.

Features: Spray gun provides instantaneous mixing by forcing elements through high-speed rollers. Gun may be

used as pouring instrument.

Description: Formulator unit for use with spray gun has operating capacity on foam of 0 to 6 lb/min. It is 3 x 4 x 3' high and weighs 750 lb, less materials in tanks.

Formulator proportions fluid streams and delivers them to gun without need for closely controlling pressure, temperature and viscosity of fluids.

Spray gun combines plural-component materials internally. It dispenses combined ingredients as mixed-and-



Spray gun instantaneously mixes plural-component coatings by forcing elements through highspeed rollers

metered end material. Unit weighs 4.5 lb, less hose and couplings. It has capacity of 10 lb/min.

(Turbulator spray gun and formulator are products of Binks Manufacturing Company, 3114-44 Carroll Ave., Chicago 12, Ill.)

Check 1560 opposite last page.

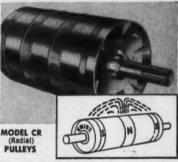
Bulk handling and storage of sulfuric acid and oleum, (I-182), chlorosulfonic acid (I-181) and muriatic acid (I-183), is covered in three bulletins. Outlined are safe procedures in bulk unloading, handling and storage of materials. Information is given on shipments, tank-car-pipe fittings, tank-truck pipe fittings, factors in determining storage-tank sizes, construction materials, level indication, tank-car tank-truck unloading methods, product sampling and safety factors. Bulls I-181, I-182 and I-183—Inorganic Chemicals Division, Monsanto Chemical Company.

Check 1561 opposite last page.

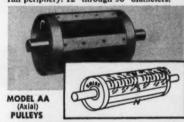
Most Complete Line Ever! EREFEZZ permanent non-electric Erium-powered MAGNETIC PULLEYS

New in 2 "duty-rated" designs—to give you the finest automatic separation for your exact application—fine iron or tramp iron removal.

NEW, EXPANDED LINE! New design, new magnetic efficiency permit increased operating range and effectiveness with 2 different magnetic actions. Peak protection for all operations—from rugged crusher protection through delicate product purification operations.



For removing large pieces of tramp iron from heavy depths of flow. Provides a strong, deep magnetic field of equal intensity around the full periphery. 12" through 36" diameters.



Excellent for fine iron separation, as well as small and medium pieces of tramp iron, in average material flows! Strong magnetic field of equal force extends across the full width of the pulley. 8", 12", 15", & 18" diemeters. Prevent product contamination, machinery damage, fires, explosions, downtime. 2 designs, 4 magnetic strengths, 8 diameters, 14 belt widths. No operating or maintenance costs. For all materials, wet or dry, on belts of non magnetic material. Fast, simple installation. *Erium —an exclusive, high quality permanent magnetic power source specifically designed and energized by Eriez.

New fact-filled 6-page bulletin has installation photos, selector guide, etc. Write today! Eriez Mfg. Co.,73-DA Magnet Drive, Erie, Pa.

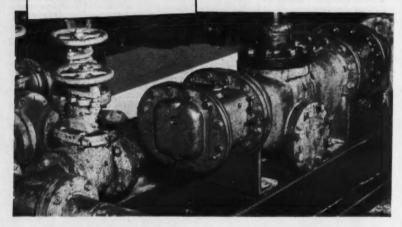


Check 1562 opposite last page.

Sier-Bath SCREW PUMPS

— pumping 200 g.p.m. of viscous Tallow and Castor Oil to plant ½ mile away, with 45 foot elevation.

FELS & CO., Philadelphia, Pa., 2 years ago replaced a costlier pump with this lower-cost Sier-Bath Screw Pump and gained high-efficiency pumping with low maintenance and operating costs. Less hoat is required for tallow, while castor oil is pumped cold, saving on steam. Uniform flow rate regardless of suction head, permits computing accurately amounts of material drawn from storage at any given time. Pump operates intermittently 8 hours a day and is fully automatic.



Sier-Bath SCREW PUMPS



External Gear and Bearing Bracket Type for non-lubricating liquids and semi-liquids



Internal Gear and Bearing Type for lubricating liquids and semi-liquids Sier-Bath Screw Pumps maintain high volumetric efficiency because "Dual-Controlled" precision rotor design prevents rotor-to-rotor or rotor-to-casing contact—provides a continuous flow without pulsation, hammering or vibration . . . without strains, misalignment and wear on rotors, shafts, bearings and gears.

Result: Dependable, uninterrupted pumping service—less maintenance—easier servicing—longer pump life—lower overall pumping costs.

Capacities from 1 to 2,000 gpm.; viscosities from 32 SSU to 1,000,000 SSU.; discharge to 1,000 psi. for viscous liquids, 200 psi. for water and light oils. Horizontal or vertical construction. Corrosion resistant alloys, special bodies, stuffing boxes and bearings for special needs. See "Yellow Pages" for your Sier-Bath representative or write Sier-Bath Gear & Pump Co., Inc., 9260 Hudson Blvd., North Bergen, N. J.



Founded 190

Altra. of Procision Goars, Rotary Pumps, Flantido Goar Complings

Member A. G. M. A.

Check 1563 opposite last page.

PLANT ENGINEERING MAINTENANCE & SAFETY



Two inner lines of complex three-in-one pipeline are made of a special high-strength alloy steel

Without using joints or hoops, Freeport Sulphur's seven-mile offshore —

Pipeline automatically compensates for 55' expansion

PROBLEM: One of the complex engineering problems concerned with the design of a seven-mile pipe line for transporting molten sulfur under water was how to compensate for 55' thermal expansion. Line was to be used for moving the sulfur from Freeport Sulphur Company's Grand Isle Mine in the Gulf of Mexico to shore.

Other problems to be overcome were how to keep the sulfur in a molten state and how to determine what heattreated alloy would meet requirements of strength, ductility and weldability.

Solution: A pipeline was designed consisting of three concentric pipes: a 14" OD outside protective casing, a 75%" OD hot-water-jacket line and a 6" OD sulfur line.

The 14" outside casing was made of conventional X-42 grade steel pipe. Inner pipes, however, were made of Jalloy No. 1, an alloy steel manufactured as a tubular product for the first time. Composition of alloy is 0.2% carbon, 1.1% manganese and 1.3% molybdenum, with remainder iron and other elements in slight quantities.

Tube was made on a seam-

less mill, then quenched and tempered to meet specifications. Minimum yield strength was shown to be 60,000 pi After hydrostatic testing and magnetic particle inspection



A 2000' fabrication rack was used to assemble unusual pipeline

pipe was shipped to Grand Isle where pipeline was fabricated on a 2000' rack.

Inner two lines will have an operating temperature of 300°F, which means that the seven-mile line will expand about 55′ in length when heated from 75°F.

Usual way of providing for such expansion is to use joints or loops. However, it was decided that these would not be effective or would be too expensive. Line was to be buried 5' deep in ocean.

After the pipeline was laid

but before it was buried, the outer 14" casing was placed in 10,000 psi tension by exerting 270,000 pounds pull to both ends of the casing. While in this tension, the ends were fixed to an anchor structure. The inner lines were then heated to 225°F and allowed to expand their normal amount of 35°. While in this expanded condition, each end of the inner lines was permanently fastened to the outer casing.

Results: When the inner lines are placed in operation and reach the operating temperature of 300°F, the thermal stress will be compressive, with combined stresses about 60% of their yield strength. Should the inner lines be cooled to atmospheric temperature, the thermal stress will reverse itself into tension



Into the Gulf of Mexico and seven miles out to Freeport's sulfur operation goes the pipeline

and combined stresses will amount to about 70% of their yield strength. As a result, longitudinal movement of the pipeline is reduced to almost nothing and therefore no expansion joints are required.

Pipeline will deliver 4700 long tons of sulfur per day to mainland where it will flow directly into insulated tank barges. Pipeline is considered to be a safe, reliable, all-weather system.

(Jalloy No. 1 tube was made by Jones & Laughlin Steel Corporation, 3 Gateway Center, Pittsburgh 30, Pa.)

Check 1564 opposite last page.

Large photo of Freeport offshore sulfur operation appears with another story on it starting on page 50



Concrete-wrecking corrosion stopped by PENNTROWEL® surfacing

Floor maintenance used to be a costly problem in the California Research Corporation's laboratory glassware cleaning facility. Concrete floors were severely corroded by daily exposure to hot detergent solutions, solvents and concentrated sulfuric acid... became impossible to keep clean and usable, a hazard to safety. The floor shown above, in the laboratory's new facility, is protected by a tough, impermeable surfacing of Penntrowel. It takes the same punishment...yet after many months of duty it shows no sign of corrosion or erosion, promises trouble-free service for years to come.

Penntrowel—the new trowel-on resin compound from Pennsalt—is fast becoming the standard surfacing material where chemical corrosion or abrasive wear is a problem. First developed and used by Pennsalt in our own acid and alkali plants, Penntrowel is being used today in plants of many types across the nation, both to protect new floors and to repair corroded concrete surfaces without expensive contracting jobs and long shut-downs. Specialized Penntrowel mixes are available for all applications, including fluorine service and heavy vehicle traffic. And Penntrowel's cost is surprisingly low!



Concentrated acid . . . calling for boots, gloves, apron and mask to protect laboratory worker . . . doesn't harm rugged Penntrowel floor at California Research Corporation.



Write for complete information

Corrosion Engineering Products Dept. 324

PENNSALT CHEMICALS CORPORATION

Natrona, Pa.

Manufactured in Canada by G. F. Sterne & Sons, Ltd., Brantford, Ontario



Check 1565 opposite last page.



BROMINE DEVELOPMENTS



Arc-welding rays

t. .*ef ultraviolet and infrared are filtered to same degree as standards set for glass in Federal specifications by plastic filters. Filters are available in standard 2 x 4½" and 7 x 11" panoramic-window sizes. The 2 x 4½" filter encased in a rubber gasket weighs less than one ounce. The 7 x 11" model weighs 4½ ounces.

(Plasti-Weld filters are product of Chicago Eye Shield Company, 2727 Roscoe St., Chicago 18, Ill.)

Check 1566 opposite last page.



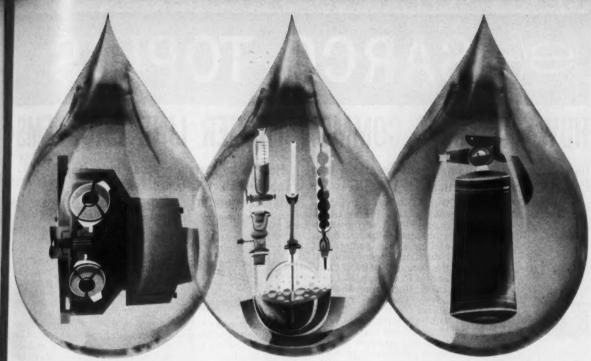
Remote hazardous testing

. . . takes place in this sand and dust chamber. Unit is reported to be largest such portable self-contained unit ever constructed.

Interior and electrical ducting is specially designed for use with hazardous materials. Chamber incorporates test space of 8' wide x 5' high x 4'



nai sci an scr me



Build High Density Fluids

Bromine is more than three times heavier than water. Hydraulic engineers, for example, find this property valuable in developing high density fluids o make possible more compact hydraulic systems without sacrificing efficiency.

React Fast

Because bromine is highly reactive, it's extremely easy to add bromine onto a compound, or to take it off. With bromine or brominated compounds, the reactions are fast, often avoid undesirable sidereactions, unwanted by-products.

Fight Fire

During World War II, specialized military fire-fighting jobs began to rely on certain brominated compounds for fast action. Use has spread to industrial applications, and current research shows additional bromine compounds of great value.

For years, the unique properties of bromine and brominated compounds have sparked the creative imaginations of scientists. In fact, they've found hundreds of individual uses, and the list keeps on growing! The three characteristics described above stand out in the spotlight of current development work to improve commercial products and processes and to make new ones possible.

Most likely, new developments for your company depend on industrial chemicals and technical knowledge to put them to work. When your needs call for bromine or brominated compounds, we suggest you call in Dow. Our latest investigations are in the areas of new fast-acting chemical intermediates, high density fluids and fire-fighting agents.

Besides providing highly pure elemental bromine, Dow also upgrades it into hundreds of compounds-both standard items and chemicals compounded to "prescription." New brominated compounds are constantly being studied. Furthermore, Dow offers its research facilities and vast experience for developing bromine's ability to serve your particular needs. For further information, return the coupon below.



Bromine was Dow's first product. The sketch shows founder Herbert Dow's first plant where, in 1891, he perfected the electrolysis method for producing bromine in commercial quantity from brine wells in Midland, Michigan. Later, Dow pioneered the recovery of bromine from sea water. In the past decade, Dow also pioneered the bulk shipment of bromine. Today, The Dow Chemical Company with expansive modern facilities continues as a major producer of highquality bromine and its compounds, with nearly 70 years' background of experience and highly developed knowledge.

See "The Dow Hour of Great Mysteries" on NBC-TV

Chemicals Merchandising Dept. 60-650LG4, The Dow Chemical Company, Midland, Michigan.

Send coupon today

Send information about:

Bromine and brominated compounds ☐ Chemical intermediates

High density fluids

Fire extinguisher fluids

We are interested in bromine for use in

TITLE

COMPANY. ADDRESS CITY STATE

DOW CHEMICAL COMPANY . MIDLAND, MICHIGAN

Check 1567 opposite last page.

fpm. Temperature variation is 77 to 160°F; relative humidity is less than 30%. (Sand and dust chamber is product of The American Research Corp., Farmington,

deep. Sand and dust density is maintained at 0.1 and 0.5 g/cu ft. Velocity specifications are 100 to 500 fpm and 2300 ±500

Check 1568 opposite last page.

Conn.)

Safe refrigerator interiors

. . . are made explosion-proof by elimination of interior mechanism and lights. Controls are located outside units, and a safety-engineered coil is employed.

Refrigerators may be used for storage of volatile liquids in laboratories. Line has models in sizes of 1 to 45 cu ft.

(Explosion-proof refrigerators are product of Nor-Lake. Inc., Second and Elm, Hudson, Wisconsin.)

Check 1569 opposite last page.



Plastic hats and caps

. . are individually dielectrically tested to meet EEI Specification AP-1 1959. Lightweight hats and caps are strong enough to withstand repeated 40-ft-lb impact tests. Molded lugs on brim permit attachment of chin straps. Snap-in suspension gives adjustment for head sizes of 61/2 to 73/4.

(Dielectric Hedgard hats and caps are product of Safety Equipment Division, Davis Emergency Equipment Co., Inc., 45 Halleck St., Newark 4, New Jersey.)

Check 1570 opposite last page.

NEW LITERATURE

Plant Engineering Maintenance & Safety

Jacketed fittings are specified in six-page brochure, which gives diagrams, charts of sizes and other pertinent information for varied application of jacketed fittings, application of Jacketed Ittings, gate valves, two- and three-way plug cocks, expansion joints and strainers. Jacketed Fittings Brochure — J. P. Devine Manufacturing Company.

Check 1571 opposite last page.

Boiler-gasket leakage is considered in eight-page bulletin which incorporates reprint of magazine arti-cle. Tech Paper 139 — Betz Laboratories, Inc.

Check 1572 opposite last page.

Safety head assemblies, designed for use with Baker rupture discs are subject of four-page catalog which incorporates full dimension-al data. Cat 459—High Pressure Equipment Company, Inc.

Check 1573 opposite last page.

Stain removal is topic of data sheet which deals with various types of stains and their removal from floors. Data Sheet SD-5910

— Puritan Chemical Company.

Check 1574 opposite last page.

Molded-case circuit-breaker line is tabulated in 40-page bulletin, giv-ing ratings, specifications and op-erating characteristics as guide in selecting breakers for variety of applications. Bul 5001-1A — The I-T-E Circuit Breaker Company.

Check 1575 opposite last page.

Fire-equipment line, including hand portable extinguishers, stationary fire equipment, piped systems and large-capacity mobile equipment such as fire jeeps and trucks is delineated in 20-page 1960 Fire Equipment Cat—Ansul Chemical Company.

Check 1576 opposite last page.

Mixed-bed demineralizers, of packaged type, are designed specially for process-water applica-tions. A four-page bulletin incor-porates schematic drawings and description of this line. Publication 5819 — Cochrane Corpora-

Check 1577 opposite last page.

Flame-retardant laminate is paperbase phenol-resin type. Physical properties and suggested uses of the material are outlined on single-sheet Bul 3.1.1.1—Taylor Fibre

Check 1578 opposite last page.

SARCO TOPICS

HOW TO SOLVE COMMON TRACER LINE PROBLEMS

How to cure water hammer with a steam trap that will operate in vertical position



Water hammer is an inherent problem in long tracer lines. So is freezing. Both problems can be overcome, and here's an example of how it has been done. At the Socony Mobil Oil Com-pany's Paulsboro, N. J., refinery, they found that the Sarco Thermo-Dynamic Steam Trap, type TD-50, not only withstands water hammer, but installing the trap in a vertical position

—which permits free drainage—presents no problems at all, thanks to its unique thermodynamic principle. In fact, 90% of the 250 TD-50's at this plant are vertically mounted. They never block heat transfer, and they remove condensate and air as fast as they collect.

How to handle varied steam pressures without adjustment

Can a trap—without adjustment—handle steam pressures that vary from 15 to 160 psi? Can the same trap vent air and drain condensate as rapidly as it is formed, be easy to install and require practically no maintenance at all? That was the problem set up by the engineering staff of Armour Chem-



ical Division's McCook plant. They solved it by testing many traps. Their conclusion: Sarco TD-50 steam traps meet or beat their specifications, because: they discharged condensate as fast as it formed, without wasting steam:

their compact inline construction made installation easy, even in tight quarters;

maintenance was practically negligible;

no adjustment was necessary for varying steam pressures. (In fact, the TD-50 is self-adjusting through its full operating range of 10-600 psi.)

No other steam trap can so adequately solve all these problems at one time.

How to be certain process fluid stays above 280° F. when outside temperature drops to -10° F.



The problem maintaining des temperatures tracer lines n not be difficult matter how treme the con tions seem to For example, tracer lines in

phthalic anhydride process at Witco Chemical Co pany's new Chicago plant had to be maintained ab 280° F. Below this temperature, the chemical sets the whole system would have to be taken apart re-assembled. That's not all; ambient temperatus sometimes could drop to -10° F.

With reliability as a prime consideration, Scientific Design Company, Inc., who designed and constructed this brand new plant, selected the TD-50.

Because the TD-50 can be mounted vertically, free-ing was no problem either. Added benefits that matter on tracer lines: the TD-50 is compact, light in weight easy to install.

What is the most reliable tracer line trapping method to prevent unscheduled shutdown?

Particularly in refineries, steam traps have to function under exactly the kind of conditions that you'd expect to cause failure—they must function equally satisfactorily on low pressure or exhaust



steam and on up through high-pressure, high temperature ranges. Not only that, but outside temperature may vary from subzero to subtropical. If maintaining design temperatures in your tracer lines appears to be hampered by these problems, consider how Phillip Petroleum Company, Kansas City, solved them. The found a trap which drains their tracer lines automatically over a full range of pressure, temperatures and loads. It's the Sarco TD-50 Steam Trap.

With only one moving part—a stainless steel dist, the TD-50 has little that can go wrong. In fact, it's so free of trouble that Phillips Petroleum Company consider their TD-50's as reliable and efficient as the piping. They now rely on 1800 of them throughout the plant.

FOR FULL INFORMATION ON TRACER LINE TRAPPING or on any steam trapping problem-see your Sarco Sales Representative or write to

635 Madison Avenue. New York 22, N. Y. Plant: Bethlehem, Pa.



SARCO =

ere are 7 Sound Reasons Vhy the Thermo-Dynamic ges a Better Job of Trapping



1. Simplicity - has only one moving part. 2. Maintenance—practically zero.
3. Wide pressure range—one trap for all pressures from 10 to 600 psi. 4. Uni-form performance—operates equally well on heavy, light, or no condensate load. 5. Operates against back pressures—up to 50% of inlet pressure. 6. Rugged—unaffected by superheat, water hammer, vibration, or corrosive condensate. 7. Minimizes inventory of spare parts.

Maintenance Time: 40 Seconds. If it now takes your maintenance crew more than a couple of minutes to service an ordinary trap, you're throwing away valuable time. This Sarco Thermo-Dynamic can be cleaned, blown out if necessary, and reassembled on the line in as little as 40 seconds.

For Prompt Information on the TD-50 . . . or for fast help on the efficient solution of any steam trapping problems, get in touch with a SARCO District Office, Sales Representative, or Distributor. (There's one near you.)

Only SARCO makes all 5 types:

Thermo-Dynamic* • Thermostatic • Liquid Expansion • Float Thermostatic · Inverted Bucket

*U.S. Pat. No. 2,817,353

TM Reg. U.S. Pat. Off.



Check 1579 opposite last page.

ENGINEERING & SAFETY

Central compression systems sup-ply air, nitrogen, helium or other gases for high-pressure pneumatic applications in pressures to 12,000 psi and 170 scfm. Systems are reviewed in 18-page Cat 125 — High Pressure Pneumatic Division, Airdox Cardox Products

Check 1580 opposite last page.

Rubber-seated butterfly valves and operators are itemized in 36-page catalog which presents detailed drawings and explanations along with this extensive technical data. Bul 5904 — Darling Valve & Manufacturing Co.

Check 1581 opposite last page.

Variable-speed sheave for standard V-belts is covered by eightpage bulletin which discusses non-freezing instruction, method of in-stallation, and other features. Exploded view shows and labels various components. Bul 6102 — T. B. Wood's Sons Co.

Check 1582 opposite last page.

Wound-wire porous metal for both filtration and non-filtration applications is delineated in six-page plications is delineated in six-page brochure, detailing capabilities and typical examples of wound-wire porous metals, with photographs, drawings and curves. Bul BFD-141 — Bendix Filter Division, Bendix Aviation Corporation.

Check 1583 opposite last page.

Industrial torque converters are treated in four-page folder which includes detailed descriptions of optional equipment, such as clutch controls, reduction drives, along with complete power curves for each of three basic models. Bul FFS-5 — Automotive Division, Clark Equipment Company.

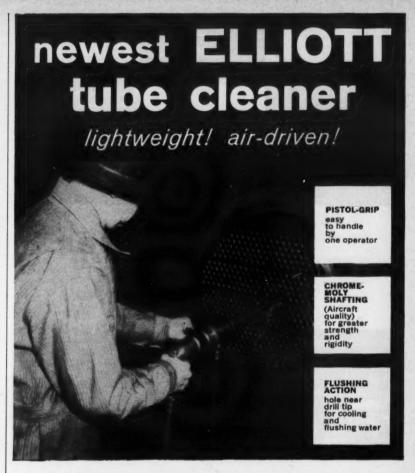
Check 1584 opposite last page.

WANTED:

To Keep You Alive

Almost everyone knows of some tricky unexpected danger situation in his plant. CHEMI-CAL PROCESSING feels that the dissemination of such information to readers is important. Therefore a monthly series on Chemical Boobytraps is now appearing in this section. (See page 164.) If you know of any such situation, please forward an account of it

Safety Editor CHEMICAL PROCESSING 111 E. Delaware Place Chicago 11, Illinois



for condenser and heat exchanger tubes

Lightweight. Powerful. Air-driven. Trigger-action control with speed governor to prevent shaft'-whip. Highspeed motor reduced through planetary gears to 1500 rpm. Integral

water-feeding attachment with fingeraction valve which controls flow of cooling water into hollow shaft and drill or brush. Built-in oil reservoir. Send for tube cleaner bulletin Y-48.



Brushes for light deposits. Four types of drills clean light, hardheavy, hard-light, and gummy deposits.

heavy-duty motor, for removing hard, heavy deposits. Ball bearings absorb thrust in either

ELLIOTT JIFFY GUN

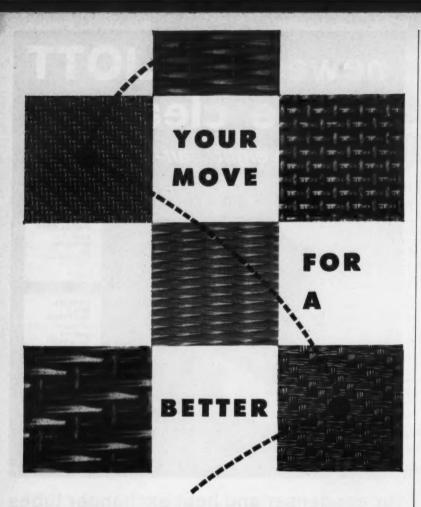
For extra-fast cleaning of light deposits in tubes 1/2 in. to 11/4 in. Air or water pressure shoots nylon brushes or rubber plugs through tubes.



ELLIOTT Company

Lagonda Plant - Springfield, Ohio

Check 1585 opposite last page.



ANTI-CORROSIVE WIRE CLOTH

- . SPACE CLOTH . MESH CLOTH
- . BACKING CLOTH . STRAINERS . SIEVES
 - . FABRICATED WIRE CLOTH PARTS



Come to NEWARK for any woven wire cloth or fabricated wire cloth parts requirement, all widths, all meshes, all malleable metals. Send for latest literature.



351 Verona Avenue • Newark 4, New Jersey

Check 1586 opposite last page.

ENGINEERING & SAFETY

Single control valve for zeolite softeners, ion exchange units and filters is subject of four-page bulletin, discussing design, operation and construction details. Bul WC-122 — Graver Water Conditioning Co.

Check 1587 opposite last page.

Thermal insulation for metal buildings, masonry buildings and industrial equipment is discussed in four-page bulletin containing technical data including typical coefficients of heat transmission for walls and roofs of various types of construction. Bul I-10—Columbia Acoustics and Fireproofing C o m p a n y, subsidiary of United States Mineral Wool.

Check 1588 opposite last page.

Packaged compressors for gas gathering are clarified in eightpage bulletin which considers 100to 500-hp types. Compressors described are skidded, prepiped and provided with closed-water system by C-B Southern, Inc., Houston, Tex. Bul 91—The Cooper-Bessemer Corporation.

Check 1589 opposite last page.

Battery chargers of constant-voltage silicon-rectifier type for stationary-type batteries, are delineated in 20-pages of technical data, which incorporates curves and statistics on charger performances of various electrical loads, along with diagrams and instructions for installing pressure alarms and detection systems. Section 90.41 — Exide Industrial Division, The Electric Storage Battery Company. Check 1590 opposite last page.

Emergency lighting equipment is depicted in eight-page catalog, which gives specifications of various types. Cat LW-1 — Electric Cord Company.

Check 1591 opposite last page.

Canned pumps of two-stage highhead leak-proof type for heads to 600°, temperatures to 850°F and pressures to 3500 psi are specified in four-page Bul 1080 — Chempump Division, Fostoria Corp.

Check 1592 opposite last page.

Welding titanium pipe and tube by gas-tungsten-arc process is explained in 24-page report, which discusses process, power supply, electrode and filler metal, titanium grades, joint design and preparation, cleaning, gas shielding, welding techniques, heat treatment, and weld quality tests. Copies of Titanium Welding Booklet are available at \$1.50 per copy from American Welding Society, Dept. T, 33 W. 39th St., New York 13, New York.



Whenever you want to combine one or more screening, washing or drying operations with conveying, you can do it easily, and at low cost, with AJAX Vibrating Conveyors.



PHONE YOUR AJAX MAN TO GO TO WORK FOR YOU

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AJAN

WESTFIELD, N. Y.

Check 1593 opposite last page.

CHEMICAL PROCESSING



manufacturers' current literature

This section features a variety of literature currently available from manufacturers. See also the other sections in this issue for new literature pertaining to those particular sections

Corrosion Control

Resin floor-surfacing material can be trowelled on. For use where corrosion or abrasion is problem, material is reviewed in Penntrowel Bul—Pennsalt Chemicals Corporation.

Check 1594 opposite last page.

Sump pumps, for acid services are covered by Bul SP-100—The Galigher Co.

Check 1595 opposite last page.

Flexible poly pipe, for water lines, drains, underground pipe or conduit in sizes of ½ to 2", is subject of Bul CE-57—American Hard Rubber Company, Division of Amerace Corporation.

Check 1596 opposite last page.

Needle valve of stainless steel is suitable for control of flow in metering or sampling. Valve is subject of Aloyco Valve Bul—Alloy Steel Products Company.

Check 1597 opposite last page.

Protective coatings of epoxy and vinyl-base types for guarding against corrosion are outlined in Bul 760—Plastics and Synthetics Division, U. S. Stoneware.

Check 1598 opposite last page.

Gaskets and O-rings of Teflon for service with acids, alkalis or solvents (except molten alkali metals) are specified in Cat P-327—Crane Packing Company.

Check 1599 opposite last page.

Pump motors have case of epoxy resin enclosing winding and turns and slot portions of stator to give acid-resistance. Super-seal Motor Bul—General Products Division, Allis-Chalmers.

Check 1600 opposite last page.

Flexible connectors of stainless steel are reviewed in Allflex Bul—Allied Metal Hose Company.

Check 1601 opposite last page.

PVC pipe, fittings and valves for corrosion service are specified in Bul CE-56—American Hard Rubber Company, Division of Amerace Corporation.

Check 1602 opposite last page.

Gear pump of hard rubber with 12-gpm capacity has all wetted parts acid-resistant. Unit is presented in Bul CE-55—American Hard Rubber Company, Division of Amerace Corporation.

Check 1603 opposite last page.

Centrifugal pumps of stainless steel, Ampco metal and Illium G, and elastomer- and rubber-lined models for corrosive service, are discussed in Centrifugal Pump Bul — Ampco Metal, Inc.

Check 1604 opposite last page.

Corrosion-resistant metals of tantalum, titanium and zirconium can be fabricated into solid or lined vessels to several thousand gal, heat exchangers, columns, accessories and custom-designed equipment. This is discussed in Bul 978—Pfaudler Division, Pfaudler Permutit Inc.

Check 1605 opposite last page.

Pressure-sensitive Teflon tape with fluoropolymer adhesive is for applications where corrosion-resistance is necessary at temperatures to 400°F. Tape is detailed in Temp-R-Tape® FR Folder—Connecticut Hard Rubber Co.

Check 1606 opposite last page.

Expansion joints are fabricated of standard compound of Teflon by means of technique which molds uniform convolutions with restraining rings. These corrosion-resistant joints are outlined in Bul B-IA—Resistoflex Corporation.

Check 1607 opposite last page.

Stainless steel is used by Tranter Manufacturing Inc. of Lansing, Michigan, for plate coil in applications such as that of maintaining constant temperature of 70 to 72° F in 16 2/3% sulfuric-acid solution. This application is outlined in Tranter Platecoil Information—Stainless and Strip Division, Jones & Laughlin Steel Corporation.

Check 1608 opposite last page.

Duct fans have propellers, duct sections, drive housings and bearing covers constructed of fiberglass. Drive shafts and bearings are stainless steel. They are subject of Bul A-116—Hartzell Propeller Fan Company, Division of Castle Hills Corp.

Check 1609 opposite last page.

Teflon tank linings, for protection against harsh corrosives such as hydrochloric, hydrofluoric and nitric acids, are subject of Teflon Linings Bul—Special Products Department, The Garlock Packing Company.

Check 1610 opposite last page.

Penton linings can convert carbonsteel tanks into vessels capable of handling highly corrosive fluids at elevated temperatures. They are explained in Tank Lining Literature—Hercules Powder Company.

Check 1611 opposite last page.

Process Instrumentation

Magnetic gages for liquid levels, for use in plants with dangerous explosive or inflammable conditions, are detailed in Magnetic Gage Engineering Sheet—Jerguson Gage & Valve Company.

Check 1612 opposite last page.

Process refractometer compares refractive index of stream with constant standard. Unit is treated in Process Refractometer Bul— Instrument Division, Mine Safety Appliances Company.

Check 1613 opposite last page.

Low-pressure controls in operating ranges of 1 to 20 and 1 to 30 psig and low-pressure diaphragm controls in operating ranges of 1.0 to 30.0" and ½ to 5 psig are among types discussed in Cat 860—The Mercoid Corporation.

Check 1614 opposite last page.

Rotameter selection is aided by use of guide which permits quick comparison of rotameter specifications to find correct model for given application. Bul 110—Brooks Rotameter Company.

Check 1615 opposite last page.

Liquid-level controls which have no moving parts in liquid are detailed in 32-page Liquid-level Control Cat—Charles F. Warrick Co.

Check 1616 opposite last page.

Liquid-level control, which incorporates magnetic operating principle is explained in Liquid-level Control Cat—Magnetrol, Inc.

Check 1617 opposite last page.

Temperature-control systems are outlined in Temperature-control Systems Literature—Thermo Electric Co., Inc.

Check 1618 opposite last page.

High-pressure gages of various types are expanded upon in Gage Cat—Strahman Valves, Inc.

Check 1619 opposite last page.

Recording-chart line is summarized in Stock List, 1960 — Technical Sales Corporation, Subsidiary of Graphic Controls Corporation.

Check 1620 opposite last page.

Internal-reflux computer system, installed at Phillips' Sweeny, Texas, refinery on LP-gas-fractionation columns, can be supplied with either pneumatic or electrical output. It fits into any control system already installed—also into any large-scale digital or unit-analytical computer installation. Set point can be adjusted manually by operator or automatically from column temperature, process analyzers and/or computers. System is described in Phillips Reflux System Literature—Taylor Instrument Companies.

Check 1621 opposite last page.

Valves

Solenoid valves, for use with pressures of 0 to 10,000 psi and temperatures of -300 to +500°F, are reviewed in 36-page catalog. Cutaway drawings are used to identify valve parts and illustrate operation in Cat 444—Atkomatic Valve Company.

Check 1622 opposite last page.

Globe and angle valves are reviewed in four-page Bul L-475— The Bastian-Blessing Company.

Check 1623 opposite last page.

Lubricated plug valves are fully opened or closed in one-quarter turn of plug. Information on these units is contained in Plug Valve Reference Books — Homestead Valve Manufacturing Company.

Check 1624 opposite last page.

Double-seal ball valves are subject of brochure, "At Your Service"—
Jamesbury Corporation.

Check 1625 opposite last page.

Valves are featured in three bulletins. Discussed are stainless valves for corrosive pulp stock (2156), nickel-chrome stainless gate valves for handling sulfuric acid at elevated temperatures (2411) and bronze gate valves (2285). Circular AD-2156 and Buls AD-2411 and AD-2285—Crane Co.

Check 1626 opposite last page.

Solenoid valves have no pilots or pistons. Valves are subject of Bul V—The Johnson Corporation.

Check 1627 opposite last page.

Water hammer's cause, effect and control (851) and check valves (654) are discussed in Buls 654 and 851—The Williams Gauge Co., Inc.

Check 1628 opposite last page.

Ball valve, in which ball is fixed in bearings, is subject of Flo • Ball Valve Bul—Hydromatics, Inc.

Check 1629 opposite last page.

Split-body valves, with face-to-face dimensions to ISA standards, are interchangeable with regular globe-body diaphragm valves. Valves are tabulated in Cat 132—Kieley & Mueller, Incorporated.

Check 1630 opposite last page.

Pumps

Laboratory pump operates by radial arms successively pressing on loop of flexible tube. Description of unit is contained in Kinetic Clamp Pump Bul—Sigmamotor, Inc.

Check 1631 opposite last page.

Precision metering of slurries is considered in catalog which discusses controlled-volume pumping. Cat 553-1—Milton Roy Company.

Check 1632 opposite last page.

Centrifugal pumps of horizontal single-stage type are subject of 10-page circular incorporating table of material specifications for various applications. Circular 217—Dean Brothers Pumps Inc.

Check 1633 opposite last page.

Chemical-feed-pump line can pump to 812 gph, and double this in duplex line. Maximum pressure is 10,000 psi. Pumps are dealt with in series 200 Pump Bul—Pump Division, American Meter Company.

Check 1634 opposite last page.

Canned-pump line includes special designs and materials for handling fluids with pressures to 5000 psi and temperatures to 1000°F in capacities to 600 gpm. These are reviewed in Bul 1100—Chempump Division, Fostoria Corporation.

Check 1635 opposite last page.

Pump cups, including conventional and 45° bevel types in full range of sizes for all reciprocating-pump and cylinder-mechanism requirements, are treated in Bul 5903— Darling Valve & Manufacturing Co.

Check 1636 opposite last page.

Metering pumps are subject of bulletin containing typical applications, flow charts and descriptions and specifications of various models. Bul 59—Process Equipment Division, Lapp Insulator Co., Inc.

Check 1637 opposite last page.

Progressing-cavity pumps, available in capacities to 500 gpm for pressures to 1000 psi, are clarified in Bul 40 CP—Robbins & Myers, Inc.

Check 1638 opposite last page.

Screw pumps, in capacities of 1 to 2000 gpm, are explained in Screw Pump Cat—Sier-Bath Gear & Pump Co., Inc.

Check 1639 opposite last page.

Jet pumps which are steam-operated are available in bronze, iron, stainless steel, plastic and other materials. Complete line is itemized in Cat 512R—Penberthy Manufacturing Company, Division of Buffalo-Eclipse Corporation.

Check 1640 opposite last page.

Vertical pump, for handling molten chemicals, and horizontal pump, for handling black caustic in evaporator service, are two models treated in Bul V-837— Taber Pump Co.

Check 1641 opposite last page.

Pump line, including both horizontal and vertical types, is pictured and described in four-page Bul 158—Nagle Pumps, Inc.

Check 1642 opposite last page.

Processing Equipment

Fume scrubbers of jet-venturi type are incorporated in Fume Scrubber Cat—Croll-Reynolds Co., Inc.

Check 1643 opposite last page.

Merger of C. H. Wheeler Mfg. Co. and Griscom-Russell Co. and effects are told in "The New Story of C. H. Wheeler Mfg. Co./ Griscom-Russell Co."—C. H. Wheeler Mfg. Co., Subsidiary of Hamilton-Thomas, Inc.

Check 1644 opposite last page.

Mix-Muller unit, for coating fine dry material, blending liquids into dry powder or dispersing small amounts of one material into another, is covered in Mulling Handbook—Simpson Mix-Muller® Division, National Engineering Company.

Check 1645 opposite last page.

Processing equipment is subject of Processing Equipment Bul—Sun Shipbuilding & Dry Dock Company.

Check 1646 opposite last page.

For more information on developments reported in this section, check corresponding numbers on Reader Service Slip opposite lest page of this issue.

Batch mixers are used to mix and/ or blend complete batch of dry free-flowing ingredients in oneminute cycles. Available in capacities of 5 qt to 160 cu ft, units are specified in Bul X-19R—Industrial Division, Daffin Manufacturing Company.

Check 1647 opposite last page.

Processing equipment of various types is considered in 48-page catalog which includes heat-exchange data. Cat G-60—Acme Process Equipment Co.

Check 1648 opposite last page.

Rotary kilns, incorporating single-support-type roller bearings, are depicted in Bul 1115—Traylor Engineering & Manufacturing, Division of Fuller Company.

Check 1649 opposite last page.

Vacuum pans, in capacities of 10 to 500 gal, and quick-cooling pans, in capacities of 50 to 200 gal, are subjects of Vacuum and Quick-cooling Pan Buls—Lee Metal Products Company, Inc.

Check 1650 opposite last page.

Kettle line includes 2/3-jacketed, 80- to 300-gal (CW); 2/3-jacketed, 5-to 500-gal (A); 2/3-jacketed, 5-to 100-gal (C); center-line scraper agitator, 80- to 300-gal (CW3T); full-jacketed, 10- to 300-gal (B); and 2/3-jacketed, 40- to 200-gal (pressure) models. These are pictured in A, B, C, CW, CW3T, and Pressure Kettle Buls—Lee Metal Products Company, Inc.

Check 1651 opposite last page.

Chemical-processing-equipment of all types is tabulated in First Facts—First Machinery Corp.

Check 1652 opposite last page.

Water treatment and ion exchange are considered in Water Treatment Information—Illinois Water Treatment Co.

Check 1653 opposite last page.

Processing equipment of various types is discussed in four-page Processing Equipment Bul—Vulcan Manufacturing.

Check 1654 opposite last page.

Pulp tanks in capacities of 500 to 2000 gal, and storage tanks, in capacities of 100 to 5000 gal, are considered in Pulp Tank and Storage Tank Buls—Lee Metal Products Company, Inc.

Check 1655 opposite last page.

Mixer incorporates spaced dual impellers for shearing action. It is depicted in Shear-flow Mixer Information—Gabb Special Products Inc.

Check 1656 opposite last page.

Heat exchanger can be applied to cooling machines or processes to temperatures approaching ambient wet-bulb. Unit is covered in Bul 132—Niagara Blower Company.

Check 1657 opposite last page.

Chemical equipment, including that for electrical generation and distribution, pumping, compressing, mechanical-power transmission, processing, water conditioning and materials handling, is subject of Chemical Equipment Literature—Allis-Chalmers.

Check 1658 opposite last page.

Lubrication

Oil reclaimer removes solids, acids and volatile impurities, along with moisture, solvents and gases by heat-vacuum process. Unit is specified in Oil Reclaimer Bul—The Hilliard Corporation.

Check 1659 opposite last page.

Force-feed lubricators start, stop, speed-up and slow-down in synchronization with machinery. Lubricators are detailed in Lubricator Cat—Manzel, Unit of Houdaille Industries, Inc.

Check 1660 opposite last page.

Lubrication as important production tool is subject of Alemite Cat

—Stewart-Warner Corporation.

Check 1661 opposite last page.

Hydraulic oil filter is detailed in Oil Filter Bul—The Hilliard Corporation.

Check 1662 opposite last page.

Drying and Heating

Gas-burner nozzles are available in IPT sizes of 3, 4, 6 and 8". Nozzles are delineated in Bul 57—National Airoil Burner Co., Inc.

Check 1663 opposite last page.

Dryers of perforated-apron-conveyor type are summarized in Dryer Literature—The National Drying Machinery Company.

Check 1664 opposite last page.

Drying equipment, including conveyor, spray, tray and truck types, is presented in Bul 448—Proctor & Schwartz Inc.

Check 1665 opposite last page.

Steam tube dryers are fabricated of aluminum, nickel, monel, inconel, stainless steels and other alloys. They are detailed in Bul 16-D-13—Hardinge Company, Incorporated.

Check 1666 opposite last page.

Drum heater consists of base upon which drum is placed and cylindrical section which is lowered over drum. This unit is reviewed in four-page Bul DH-100—Glas-Col Apparatus Company.

Check 1667 opposite last page.

Burner settings, which can meet any time-temperature cycle within ± 2°F, are expanded upon in Bul DC-1—General Industry Div., Selas Corporation of America.

Check 1668 opposite last page.

Air dryer supplies 20 cfm of air dried to dew point of -60°F or lower and is completely automatic. Dryer is detailed in Bul B6A—Pittsburgh Lectrodryer Division, McGraw-Edison Company.

Check 1669 opposite last page.

Packaged air heaters, providing outputs of 200,000 to 30 million Btu/hr at temperatures of 300° to 1500°F or higher, are clarified in Bul 112—Thermal Research & Engineering Corp.

Check 1670 opposite last page.

Plant Engineering and Maintenance

Water tube boilers which are available in sizes of 40- to 150 bhp and occupy 5 x 8' (for largest size) are subject of Water Tube Boiler Buls—Vapor Heating Corporation.

Check 1671 opposite last page.

Roller chain, which comes in double-pitch series, and sprockets, which have reusable bushings, are tabulated in Sprockets and Roller Chain Buls—Dodge Manufacturing Corporation.

Check 1672 opposite last page.

Dye penetrant in pressurized spray cans, reveals leaks and cracks. Product is reviewed in four-page Spotcheck Bul—Magnaflux Corporation.

Check 1673 opposite last page.

Handy engineering-data tables are contained in eight-page pamphlet, which incorporates information on weights and specific gravities, engineering constants, steam coils in storage tanks, short-cut engineering conversion factors, ampere ratings for induction motors, and torque and hp equivalents, among others. Engineering Reference Pamphlet—First Machinery Corp., Inc.

Check 1674 opposite last page.

Motor-control centers are detailed in Bul SM-244—Square D Company.

Check 1675 opposite last page.

Floor-patching material bonds tight to old concrete and is instant-setting. Features of this product are outlined in Instant-Use Brochure—Flexrock Company.

Check 1676 opposite last page.

Torque wrenches are considered in manual which includes formulas, applications, engineering data, screw-torque data and other information. Torque Manual— P.A. Sturtevant Co.

Check 1677 opposite last page.

Glassed-steel tanks for storing sticky, pure or corrosive products are covered in bulletin containing specifications. Bul 975—Pfaudler Division, Pfaudler Permutit Inc.

Check 1678 opposite last page.

Mechanical seals, which can be used with wide range of pressures, temperatures and liquids, are specified in Cat 480—Durametallic Corporation.

Check 1679 opposite last page.

Sight glasses, with holes from ½ to 2" in diameter, in nine thicknesses (from ½ to 1½"), and in sizes to 24 x 60" are subject of Sight Glass Literature—Swift Glass Division, Swift Lubricator Company, Inc.

Check 1680 opposite last page.

Drives, of positive-infinitely variable-speed type, incorporate allmetal self-tooth-forming chain which maintains grip with radially grooved wheels. These units are considered in Book 2274—Link-Belt Company.

Check 1681 opposite last page.

Spray-nozzle specifications, including data on materials dimensions, flow rates, pressures and angles of spray, are outlined for various models in Spray Nozzle Profiles—Spray Engineering Company.

Check 1682 opposite last page.

Multiple-V-belt drives are summarized in Bul M141—Manhattan Rubber Division, Raybestos-Manhattan, Inc.

Check 1683 opposite last page.

Steel buildings can be built in variety of sizes through selection of pre-engineered components. This is subject of Steel Building Literature—Butler Manufacturing Company.

Check 1684 opposite last page.

Wire cloth, in variety of standard meshes or weaves is topic of Bul 10—The Cleveland Wire Cloth & Mfg. Co.

Check 1685 opposite last page.

Packaged compressors from 100 to 500 hp are subject of eight-page Bul 91—The Cooper-Bessemer Corporation.

Check 1686 opposite last page.

Hex wrenches of offset and end types are considered in Hex Wrench Bul—The Ridge Tool Company.

Check 1687 opposite last page.

Acid inhibitors for industrial cleaning are subject of four-page bulletin which incorporates table of application information for use with various metals. Rodine Bul—Amchem Products, Inc.

Check 1688 opposite last page.

Fluids Handling

Steam traps are subject of 48-page booklet which tells how to correctly size, install and maintain steam traps. Cat K—Armstrong Machine Works.

Check 1689 opposite last page.

Tempered-glass pipe and fittings are detailed in 16-page bulletin which includes schematic drawings of various products in line. Kimax Pipe Bul—Glass Products Division, Fischer & Porter Company.

Check 1690 opposite last page.

Pipe couplings of various types are outlined in Couplings Literature—Victaulic Co. of America.

Check 1691 opposite last page.

Pipe-fabrication standards are subject of 11 bulletins. They are "Machining Backing Rings For Butt Welds," "Dimensioning Welded Assemblies," "Linear Tolerances Bending Radii," "Shop Hydrostatic Testing," "Cleaning Fabricated Piping," "Built-up Weld, Metal Bosses," "Welded Nozzles—Spacing," "Preheat-Postheat Before, After Welding," "Arc-welding Dissimilar Ferritic Steels," "Stress Relieving Practices" and "Affixing Permanent Symbols to Piping"—The Pipe Fabrication Institute.

Check 1692 opposite last page.

Valves, fittings, flanges and unions of stainless and alloy steel are specified in 432-page Cat F-10—Henry Vogt Machine Co.

Check 1693 opposite last page.

Jacketed welded pipe and fittings are hydrostatically tested at 450 to 500 psi. Welded steel-jacketed fittings are suited for process pipe at pressures to 300 psi and temperatures to 750°F. They are tabulated in Bul J-57—Hetherington & Berner Inc.

Check 1694 opposite last page.

Pipe fittings, of malleable-iron, PVC-lined, plastic and aluminum types, are detailed in Malleable-iron, PVC-lined, Plastic and Aluminium Fittings Buls—Victaulic Company of America.

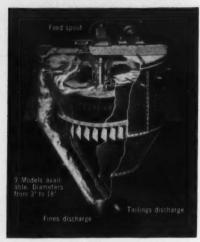
Check 1695 opposite last page.



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Closed-circult air separation is of proved advantage in reduction processes. Result is a better, more uniform product. Grinding mills perform at top efficiency, output frequently increases as much as 300%, power costs drop as much as 50%.

Precise separation of all dry powdered materials. Sturtevants currently classify sulfur, soybeans, phosphate, chocolate, feldspar, sand and aggregates, pigments, limestone fillers, flour, abrasives, plastics, gypsum, ceramics, cement and other products.

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Sturtevant Air Separators do a mechanical job of winnowing. Precise control of whirlwind air currents and centrifugal force results in the desired size being lifted into fines cone, oversize falling into tailings cone.

A 16 ft. Sturtevant, for example, has taken a feed rate of 800 tph, containing only a *small* percentage of desired fines, and delivered 30 tph 90% 200 mesh, recirculating the oversize through the grinding circuit.

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Check 1696 opposite last page.

CURRENT LITERATURE

Strainers are treated in Strainer Cat—Multi-Metal Wire Cloth Co., Inc.

Check 1697 opposite last page.

Stainless pipe unions have fully confined Tefton seal and provides double-sealing action. Units are tabulated in Koncentrik® Pipe Union Cat—The Special Screw Products Company.

Check 1698 opposite last page.

With valved couplings on flexible lines, hoses can be switched to any base-stock line as required. Couplings are delineated in Cat 59—Snap-Tite.

Check 1699 opposite last page.

Teflon flexible tube for service from -450 to above +500°F is expanded upon in Teflon Tube Bul—Pennsylvania Fluorocarbon Co., Inc.

Check 1700 opposite last page.

Chemical Materials

In-situ epoxidation process, using ion-exchange resins as catalyst, is discussed in In-situ Epoxidation Data—Becco Chemical Division, Food Machinery and Chemical Corporation.

Check 1701 opposite last page.

Formaldehyde is available as stabilized type which permits safe storage at 15 to 20°F below previously recommended levels. Corroborating information is available in Formaldehyde Data—Celanese Chemical Company, Division of Celanese Corporation of America.

Check 1702 opposite last page.

Petroleum sulfonates (petronates) are topic of Petroleum Sulfonates Literature—White Oil Division, Sonneborn Chemical and Refining Corporation.

Check 1703 opposite last page.

Fluoride-containing acetones, including dichlorotetrafluoroacetone, trichlorotrifluoroacetone and monochlorodifluoroacetic a c i d, are subject of Fluorine-containing Acetone Data Sheet and Fluorine-containing Acetone Report—Product Development Department, General Chemical Division, Allied Chemical Corporation.

Check 1704 opposite last page:

Benzoyl chloride, phosphorus oxychloride and caustic soda are considered in the four pamphlets, Benzoyl Chloride Data Sheet, Phosphorus Oxychloride Data Sheet, Caustic Soda Buyer's Guide and Caustic Soda Data Sheet—Hooker Chemical Corporation.

Check 1705 opposite last page.

Silicone defoamers, which are available in spray cans for smaller batch processes, are delineated in Silicone Defoamer Data—Dow Corning Corporation.

Check 1706 opposite last page.

Benzoyl peroxide information is presented in Benzoyl Peroxide Data Sheet—Lucidol Division, Wallace & Tiernan Incorporated.

Check 1707 opposite last page.

Separation and

Centrifugal impact mills are reviewed in Impact Milling Literature—Entoleter, Division of Safety Industries, Inc.

Check 1708 opposite last page.

Centrifuges, which are available in five sizes of 6- to 16-cu-ft capacities, incorporated infinite-variablespeed drives. They are clarified in Tornado-matic Bul—Fletcher Centrifuges, Div. of Sharples Corp.

Check 1709 opposite last page.

Screeners are topic of 32-page bulletin which includes information on variety of applications, construction data, and table of comparative openings for silk, nylon and wire screen cloth. Bul 905—The Orville Simpson Company.

Check 1710 opposite last page.

Solid deliquefication equipment is subject of Super-D-Hydrators, Vertical Super-D-Canters, Nozljectors, Continuous Dehydrators and Basket Centrifuges Data — The Sharples Corporation.

Check 1711 opposite last page.

Cyclones for dry dust recovery are presented in Bul C-958—The Ducon Company Inc.

Check 1712 opposite last page.

Micronizers grind and classify in one operation in single chamber. They are reviewed in Micronizer Bul—Sturtevant Mill Co.

Check 1713 opposite last page,

Magnetic equipment, including magnetic separators for tramp-iron removal, purification and concentration of ores, and lifting and holding equipment, is expanded upon in Bul 99A—Stearns Magnetic Products, Division of Indiana General Corporation.

Check 1714 opposite last page.

Mills for granulating and pulverizing variety of products are outlined in Bul 59—The Bauer Bros.

Check 1715 opposite last page.

Vibrating screens are delineated in Vibrating Screen Bul—The W. S. Tyler Company.

Check 1716 opposite last page.

Rod and ball mills, which have cast-steel or Meehanite heads, are delineated in Rod and Ball Mill Bul—Kennedy Van Saun Manufacturing & Engineering Corp.

Check 1717 opposite last page.

Safety

Fire hose, of lightweight neoprenecovered type which is 300-lb test, is clarified in Cat FH-59—Goodall Rubber Company.

Check 1718 opposite last page.



"The man in the lab says I'm radioactive. . ."

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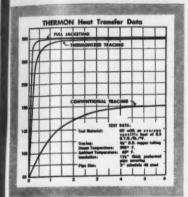
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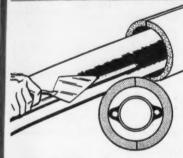
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Wherever heat transfer is a problem, non-metallic, adhesive Thermon Heat Transfer Cement, with its highly efficient heat transfer properties, usually can effect a solution. Approximately 5,000 different users, with hundreds of applications, have realized savings of up to 90% with Thermon.

Thermon can easily be applied over both steam tracing and electrical resistance systems, and is equally effective for heating and cooling operations.

Thermon's heat transfer characteristics are approximately 11 times superior to those of steam tracing, and almost equal those of steam jacketing. Almost without exception, Thermon can be used in place of expensive steam jacketing—and can often be applied where steam jacketing is impossible. Up to 90% of the cost of steam jacketed equipment has been saved through use of Thermon.

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Houston, Texas

Check 1719 opposite last page.

APRIL 1960

CURRENT LITERATURE

Protective breathing equipment, including masks and air cylinders, are covered in Breathing Equipment Bul—Scott Aviation Corp. Check 1720 opposite last page.

Safety heads, incorporating rupture discs designed to alleviate pressures at any specified point from 3 to 100,000 psi, are treated in Safety Head Bul—Safety Head Div., Black, Sivalls & Bryson, Inc. Check 1721 opposite last page.

Emergency lights are made in various models, including those for hazardous exposure. They are subject of Watchmaster Cat and Watchmaster Technical Specs—Carpenter Mfg. Company.

Check 1722 opposite last page.

Wet-weather clothing of PVC has seams stitched with synthetic thread and then shielded and electronically welded. Line is discussed in PVC Clothing Bul—Jomac Inc. Check 1723 opposite last page.

Convertible vapor-tight fixtures are available in standard or shallow-dome, deep-bowl or angle-type reflectors, and 100-w and 150/200-w vapor-tight unit assemblies. They are treated in Vapor-tight Fixture Bul—Appleton Electric Company.

Check 1724 opposite last page.

Material Handling

Mechanized bulk-storage systems of glassed-steel with mechanical sweep-arm bottom unloaders are delineated in Bul MU-100—A. O. Smith Corporation.

Check 1725 opposite last page.

Bin vibrators, for bins to ¼" wall thickness and 50-cu-ft capacities are expanded upon in Bin Vibrator Literature—Eriez Mfg. Co.

Check 1726 opposite last page.

Pneumatic bulk trucks have aluminum trailer units, each with capacity of 1182 cu ft. These are described in Bul 205-A—Sprout-Waldron.

Check 1727 opposite last page.

Metal-mesh conveyor belts, available in variety of meshes, weaves and metals or alloys, are expanded upon in 130-page Conveyor Belt Reference Manual—The Cambridge Wire Cloth Co.

Check 1728 opposite last page.

Vibratory feeders are electro-permanent-magnetic type with capacities to 50 tph. They are clarified in Vibratory Feeder Literature— Eriez Mfg. Co.

Check 1729 opposite last page.

Quality

metal,
mesh,
weave,
wire size



If the job is filtering, straining, sizing . . . and you want to do it better at less cost . . .

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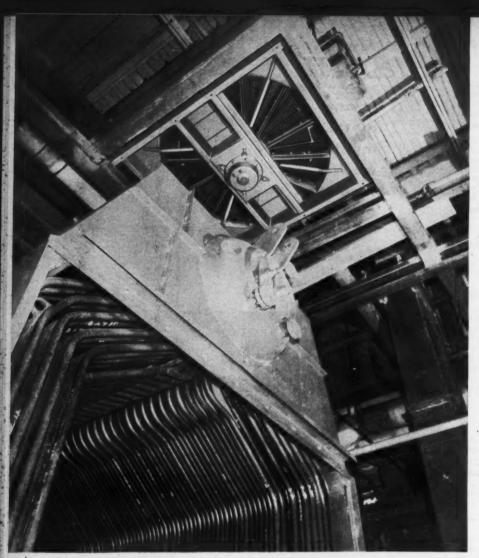
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L-S and Star Clott and Screens are woven from any steel including high-carbon, oiltempered, stainless and other alloys; Monel, bronze, copper, brass or any metal that can be drawn into wire.



The Ljungstrom Air Preheater at the B. F. Goodrich Company Shelton Plant is installed directly over the 65,000 lb/hr Wickes boiler. Flue gas leaving the boiler at 615°F passes through the circular rotor, which absorbs the heat and releases it into the incoming air. Preheated combustion air improves combustion, makes fuel burn cleanly. This Package Air Preheater was factory-assembled, and required only 100 manhours to install.

At B. F. Goodrich Co.'s Shelton Plant

Air Preheater boosts combustion air temperature 345°F... gives 6% more thermal efficiency

"Only a Ljungstrom® Air Preheater, with its continuous regenerative principle, could meet our requirements", says A. G. Sandomirsky, Manager of Engineering at the B. F. Goodrich Company, Shelton, Conn., plant. "We produce foam rubber 24 hours a day,

five and six days a week. With an Air Preheater we can meet process steam requirements more economically, and an Air Preheater helped us to justify the installation of high efficiency, high pressure equipment for by-product power generation."

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For more information on the Ljungstrom continuous regenerative principle, or on the Air Preheater that meets your requirements, phone MUrray Hill 2-8250 or write to The Air Preheater Corporation.

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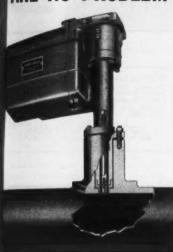
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For details on the Flush Diaphragm Pressure Transmitter, request Bulletins A-713 and A-718. Swartwout Division, Crane Co., Hooksett Industrial Park, Manchester, N.H.



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Check 1732 opposite last page. APRIL 1960

CURRENT LITERATURE

Conveyor-scale systems permit through-put data at any point from incoming transfer to inven-tory stock pile. Products are re-viewed in Bul 60—Weighing & Control Components, Inc., Div. of CompuDyne Corp.

Check 1733 opposite last page.

Conveyors, which fluidize dry, pulverized materials with low-pressure air, are clarified in Airslide® Fluidizing Conveyor Bul—Fuller Company, Subsidiary of General American Transportation Corpo-

Check 1734 opposite last page.

Packaging

Steel drums, both new and reconditioned, are subject of Steel Drum Literature—Newark Steel Drum Co. Inc.

Check 1735 opposite last page.

Lined steel containers are subject of Lined Steel Container Data-Rheem Manufacturing Company. Check 1736 opposite last page.

Portable bag closer which is airoperated is available with optional tape-binding attachment. This equipment is covered in Bag-closing Equipment Cat—Dave Fisch-

Check 1737 opposite last page.

Steel gas cylinders are considered in Gas Cylinder Bul—Harrisburg Steel Co., Division of Harsco Corporation.

Check 1738 opposite last page.

Polyester film, which can be heat-sealed in less than two seconds at 300 to 400°F and 20 to 60 psi, resists temperatures in -70 to +240°F range. It is outlined in Scotchpak Bul—Film Products Group, Minnesota Mining and Manufacturing Company.

Check 1739 opposite last page.

Phenolic-lined containers are subject of Lined Container Information—Container Division, Jones & Laughlin Steel Corporation.

Check 1740 opposite last page.

Plastic liners, for steel drums, fiber containers, cartons and boxes, are tabulated in Protective Liner Bul—Protective Lining Corpora-

Check 1741 opposite last page.

Marker, which attaches to conveyors and case sealers to mark side or top, holds up to full week's supply of ink. This unit is specified in Rolacoder Literature—Adolph

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recent books

"Maleic Anhydride Derivatives," Reactions of The Double Bond, consists of a presentation of 116 different types of chemical reactions involving maleic anhydride or one of its simple unsaturated derivatives. Each reaction selected is representative of a particular type with each preparation confined to a set of two open pages.

Net equation and a brief description of the method appear on the right-hand page. Comments, a description of reaction products, and possible uses are given on the lefthand page.

In preparing this 269-page work, the authors Lawrence H. Flett and William Howlett Gardner, both of National Aniline Division, Allied Chemical and Dye Corporation, aimed particularly at the busy investigator who likes to browse through chemical reactions looking for thoughts to stir his creative imagination.

To obtain "Maleic Anhydride Derivatives" remit \$8.00 to John Wiley & Sons, Inc., 440 Fourth Avenue, New York 16, N. Y.

Check 1745 opposite last page.

Amino resins are subject of 220page book, the 13th in a series. Authored by John F. Blais, Chemical Consultant, it describes applications for amino resin products and includes basic chemistry and manufacturing procedures. Included in the discussions are urea, melamine, ethylene urea and benzoguanamine. To obtain "Amino Resins" remit \$4.95 to Reinhold Publishing Corporation, 430 Park Avenue, New York 22, N. Y.

"Applied Solar Energy Research" is presented as a basic reference text in solar science. This 375-page bibliography serves as a directory of significant literature published by The Association For Applied Solar Energy in fulfillment of its charter objective of encouraging and coordinating scientific research in connection with solar energy. To obtain "Applied Solar Energy Research" remit \$7.50 to Association For Applied Solar Energy, 3424 North Central Ave., Phoenix, Arizona.

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Chemical industry facts book for 1960-61 is fourth edition of this valuable reference which is published every other year. Complete spectrum of the U.S. Chemical Industry is presented, Statistics in both chart and table form round out succinct views of every phase of the industry, adding up to a definitive profile. Copies of "The Chemical Industry Facts Book—1960-61 Edition" are available at \$1.25 per copy from Manufacturing Chemists' Association, Inc., 1825 Connecticut Ave., N.W., Washington 9, D.C.



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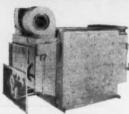
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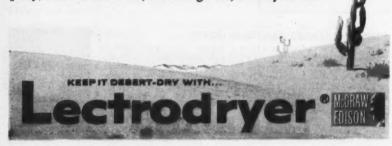


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Totally Enclosed — Dust-Tight — Sanitary

There is no vertical screw conveyor that can compare with a Screw-Lift because its design includes all the elements that make operation successful. For instance, the patented enlarged junction where the horizontal and vertical units meet—that's what forestalls choking at this vital point! The vertical screw takes up all the material which the horizontal unit feeds into it. This, coupled with Patented Stabilizer Bearings and special treatment of flights at feed and discharge ends further produces a smooth flow of material.

The casing is split for accessibility. Patented Slip Couplings permit removing any length of conveyor. There are no cumbersome drives or complicated supports required. The unit is compact, requires little space and is simple to install. It functions as a machine, coordinated with your other process-

Where materials of an edible or corrosive nature are to be where materials of an ecipie or corrosive nature are to be handled, Screw-Lift is obtainable in a quick-opening type for easy cleaning by vacuum or scrubbing. Alloy metals, such as, Stainless Steel, Everdur, Brass, besides Steel and hot-dip galvanizing, are also used in its manufacture.

Screw-Lifts have solved many difficult elevating problems. Our engineers will gladly assist you in adapting them to your needs. Write for Bulletin M-500-2.

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Repairs broken factory floors without the usual traffic tie-up. Simply shovel INSTANT-USE into hole or rut-temp smooth
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that's interesting

Thought-provoking slants on projects and products

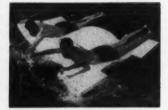


Process plant pictured on West Indies stamp

A recently completed process plant which converts sea water to fresh water at a rate of 2,700,000 gpd is saluted with a commemorative stamp issued by the Island Territory of Aruba, Netherlands, West Indies.

Plant, designed and built by Singmaster & Breyer, Inc., New York engineers, also produces marketable surplus of electricity (12,500 kw).

Shown on stamp is line of huge cast iron evaporators.



Buoyant boat cushions form emergency raft

A new safety device has been made available to sailors by the simple expedient of snapping together boat cushions that float. The result is an emergency raft capable of supporting a dozen or more persons.

The cushioning material is a vinyl sponge developed by United States Rubber Company. It cannot absorb water because it consists of many individual cells, all of them "closed." Besides its buoyancy, the material is self-. extinguishing and will not support flame.



Mix and move fluids quickly ... pump direct from drum!

ferent fluids direct from original containers. Ideal for batching, applying or mix-ing...fluids are transferred quickly and safely. Aids good housekeeping; eliminates contamination.

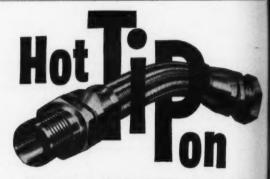
Graco Fast-Flo Pumps reduce Send for more information handling costs. They transfer measured amounts of dif-Fast-Flo that's suited box for large and small oper-tions. It handles materials as thin as alcohol, as this as cookie frostings! Fast-Fa Pumps are also available in stainless steel. Send for free idea booklet!



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Sales Office

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FLUID LINE PROBLEMS

AEROQUIP Flexible Hose

and Reusable **super gem ** Fittings*

Even under high pressure, constant flexing and temperatures from -65° to 450°F., users report long life for Aeroquip Hose of Teflon and "super gem" Reusable Fittings—chemically inert, excellent lubricity, ideal for chemicals, hot air, solvents and steam. Get bulletin IEB-50—or see "Yellow Pages" under "Hose" for your Aeroquip Distributor.



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If you want more information on processes, materials, controls, or other developments discussed herein, as you read this issue, ask our READER SERVICE DEPARTMENT... use this sheet

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### 'Plants' for drugs

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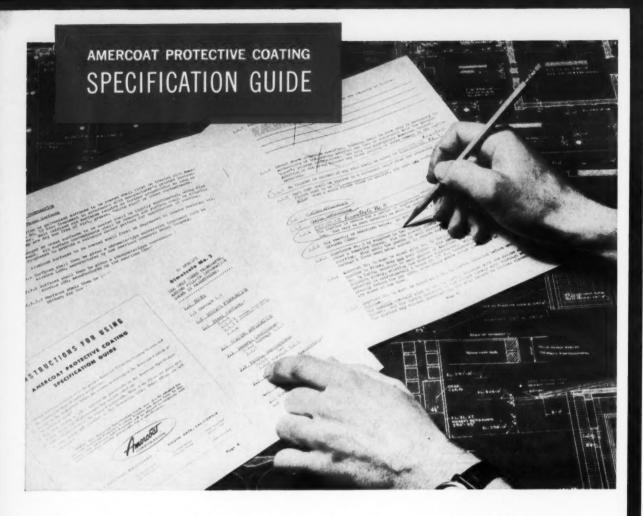
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## Here's the Beginning of a Good Coating Job

Tight, comprehensive specifications are the beginning of a successful protective coating application. Unless specifications are complete and detailed, costly failures or confused, inaccurate bidding can result.

Now, engineers who write specifications for protective coating applications can insure complete, accurate specifications through use of the new American Protective Coating Specification Guide.

The Guide is based on recognized best practices in the industry, such as Steel Structures Painting Council Specifications, and contains paragraphs covering all phases of coating application from surface preparation to inspection.

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